



## International Conference on Biodiversity

Abs Soc Indon Biodiv  
vol. 8 | no. 2 | pp. 29-59 | December 2021  
ISSN: 2407-8069



*Habenaria tosarimensis* (Endemic Orchid from Java, Indonesia). Photo by Gilang Dwi Nugroho

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# ABSTRACT

## INTERNATIONAL CONFERENCE ON BIODIVERSITY

SOCIETY FOR INDOONESIAN BIODIVERSITY  
Surakarta, 18 December 2021



# ABSTRACT

## INTERNATIONAL CONFERENCE ON BIODIVERSITY

SOCIETY FOR INDONESIAN BIODIVERSITY

Surakarta, 18 December 2021

### THEME:

**Microbiology to Multiple Industrial and Environmental Application  
to Support Sustainable Development and Improve Human Welfare**

#### SECRETARIAT ADDRESS

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**TIME SCHEDULE**  
**International Conference on Biodiversity**  
**Society for Indonesian Biodiversity (SIB)**  
**Surakarta, Indonesia, 18 December 2021**

<b>TIME</b>	<b>ACTIVITIES</b>	<b>PERSON IN CHARGE</b>	<b>SITE</b>
<b>Time in Jakarta, Indonesia</b>			
<b>December 18, 2021</b>			
<b>07.30-08.00</b>	Registration	Committee	Lobby
<b>08.00-08.30</b>	Opening ceremony - Indonesian National Anthem - Pray - Message from the Chairman of SIB (Widi Sunaryo, Ph.D)	Committee	Main Room
<b>08.30-09.30</b>	Keynote speaker: <b>Assoc. Prof. Dr. Khairul Adha bin A. Rahim</b>	Moderator: <b>Prof. Dr. Andria Agusta</b>	Main Room
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Note: A. Genetic Diversity, B. Diversity of Species, C. Diversity of Ecosystem, D. Ethnobiology and Socioeconomics, E. Bioscience (Life Science and Technology); O. Oral.

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**Genetic diversity**

**AO-01**

**Kinship relationship of red-eared slider *Trachemys scripta elegans* based on Cytochrome Oxidase Subunit I (COI) gene marker**

**Agus Alim Hakim, Arya Tri Pandoyo, Nurlisa A Butet, Ali Mashar, Mohammad Mukhlis Kamal, Yusli Wardiatno**

Department of Aquatic Resources Management, Faculty of Fisheries and Marine Sciences, Institut Pertanian Bogor. Jl. Raya Dramaga, Bogor 16680, West Java, Indonesia

Red-eared slider (*Trachemys scripta elegans*) is a type of turtle that is widely used as a pet. These turtles are introduced species and can reach adult size quickly, so their presence in the wild can threaten native species. This study aims to determine the kinship relationship of red-eared slider using Cytochrome Oxidase Subunit I (COI) gene markers from several locations in Bogor. This research was conducted from June to November 2021. Eleven samples were collected from fish market center include Bogor city, Parung, and Laladon. DNA extraction and amplification used commercial kit with standard procedure. Editing sequences, calculating genetic distances, and constructing phylogeny tree were performed using MEGA X software. The results of BLASTn in all samples obtained the similarity with *Trachemys scripta elegans* (code access: MW019443.1). The percent identity of all samples is 99.70-100%. The genetic distance between samples are 0.0000-0.0032 and compared with out-groups (other fresh water turtles and sea turtles) are 0.1297-0.1677.

COI, genetic, invasive, turtle

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**Note:** In order to avoid improper conduct of third parties against authors by using email addresses, starting on 2018 correspondence emails (♥) are not listed. Colleagues can communicate with the author by mail or contact us at biodiversitas@gmail.com

**AO-02**

**Antimicrobial potential of nudibranch *Chromodoris lineolata* associated bacteria against skin disease pathogens**

**Aldi Pratama Wijaya<sup>1</sup>, Ocky Karna Radjasa<sup>2</sup>, Mada Triandala Sibero<sup>1</sup>, Agus Trianto<sup>1</sup>, Alexander Martynov<sup>3</sup>, Tanya Korshunova<sup>4</sup>, Agus Sabdono<sup>1</sup>**

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Skin disease is the fourth most common disease caused by infection of opportunistic pathogens on the skin. Skin diseases are generally treated by antibiotic products. However, overuse of antibiotics can increase the resistance of pathogens to various classes of antibiotics. Therefore, the study of new antibiotic compounds against MDR pathogens is urgently needed. This study aims to isolate nudibranch *Chromodoris lineolata* associated bacteria with antimicrobial activity against various skin pathogens and detect the presence of PKS I, PKS II, and NRPS genes through a molecular approach. Screening of the isolates antimicrobial activity using an agar plug method indicated that 3 bacterial strains namely CL 3.8, CL 10.5, and CL 10.11 showed antimicrobial activity against *Propionibacterium acne* and *Malassezia furfur*. Molecular identification through BLAST homology showed that strain CL 3.8, CL 10.5, and CL 10.11 are closely related to *Streptomyces lateritius*, *Labrenzia marina*, and *Halomonas meridiana*, respectively. The detection of the biosynthetic gene cluster showed that the PKS II gene was detected in *S. lateritius* and *L. marina* with the base pair range of 600-650 bp. These results indicate that bacteria associated with marine nudibranchs have future potential for the development of broad-spectrum antibiotics.

Antimicrobial, marine nudibranch, NRPS, PKS, skin pathogen

### AO-03

#### The diversity of three local varieties of shallots for fried onion originating from Central Sulawesi, Indonesia

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Central Sulawesi has diverse genetic resources, one of them is shallot. There are various local shallots originating from Central Sulawesi, both used as spices and as raw materials for fried onion. Fried onion is a typical product of Palu City, Sigi Regency, and Donggala Regency. It has superiorities and peculiarities, including having a distinctive aroma, dense shallot texture, crispier fried onion, and longer shelf life. There are three local varieties originating from Central Sulawesi which are used as raw material for the fried onion industry, namely Lembah Palu, Palasa, and Kanari variety. Lembah Palu and Palasa variety have been released by Indonesian Ministry of Agriculture, while Kanari is still in the process of registering varieties. The local varieties of Palasa and Kanari are originating from Palasa District, Parigi Moutong Regency, while Lembah Palu variety is originating from Palu City. These three types of shallot local varieties have their characteristics. The tuber's color of Lembah Palu variety is pale red, while the tuber of Palasa variety is darker than Lembah Palu variety. Both varieties have small to medium tuber size. Meanwhile, Kanari has a larger tuber size and crispier fried onion than other varieties

Central Sulawesi, fried onion, local variety, shallot

### AO-04

#### Genetic diversity and population structure of the sunburst fiddler crab *Tabuca dussumieri* (H. Milne Edwards 1852) in the Indonesian Archipelago

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Fiddler crabs are a well-known group of Ocypodid crabs and they are widespread throughout tropical and subtropical regions of the Indonesian Archipelago. Molecular phylogeny

and population structure in the sunburst fiddler crab, *Tabuca dussumieri* were investigated to develop a better understanding of this species' evolutionary history. Nucleotide sequence analysis was performed from a PCR amplified fragment of mitochondrial DNA cytochrome oxidase subunit I (mt-DNA COI) using the universal primers LCO 1490 and HCO 2198. A total 613-615 bp nucleotide sequence was obtained from 96 specimens collected from three sites throughout Indonesia, i.e., Banyuwangi (Java Island), Bali Island, and Lombok Island. The results showed intermediate haplotype diversity ranged from 0.88 to 0.92, while nucleotide diversity values were lower (range: 0.4 to 0.7%) than those reported previously for other crustacean taxa. Mismatch distribution and Bayesian Skyline Plot analysis was used to evaluate possible historical events of population growth and decline. Pairwise FST value showed strongly significant genetic differences between populations from Lombok Island and other populations. We hypothesize that physical oceanic barriers coupled with a short pelagic larval duration is responsible for creating the patterns we report. Results here provide a foundation for developing better conservation strategies for this species in the future.

Genetic diversity, mitochondrial DNA, oceanic barrier, population structure, *Tabuca dussumieri*

### AO-05

#### Phylogenetic study of *Gyrinops versteegii* (Gilg.) Domke, the agarwood-producing tree from Indonesia

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*Gyrinops versteegii* is one of the tree species that produces agarwood. The massive illegal logging of *Gyrinops* trees in their natural habitats has resulted in the tree being included in Appendix II by CITES. CITES permits must be listed for products traded across countries and therefore, correct species identity must be secured. Genetic tools can be used to identify the species with high accuracy based on cpDNA markers. Due to wide distribution of the species, on site analysis nearby the natural distribution has been proposed based on available technologies. We performed phylogenetic analyses on *G. versteegii* chloroplast (cp) genomes using Oxford Nanopore Technologies (ONT) MinION. Sequence

datasets were processed by de novo assembly with NanoGalaxy server and followed by annotation using Geseq. Phylogenetic analysis was conducted to determine the relatedness of six chloroplast genomes of *G. versteegii* from our study and two publicly available reference chloroplast genomes from *G. walla* and *Aquilaria sinensis*. *Eucalyptus grandis* is used as an outgroup. All sequences were aligned using MAFFT v7, phylogenetic analysis was performed using the Maximum Likelihood method, and the phylogenetic tree was constructed using MEGA7 with a bootstrap value of 100 replicates. Our results showed that all samples of *G. versteegii* in the clade Thymelaeaceae clustered after *E. grandis*.

Agarwood, chloroplast, *Gyrinops versteegii*, genome, NanoGalaxy, ONT

## **AO-06**

### **Determination of MSTN (Myostatin) genes of the Gorontalo local chicken**

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Analysis studies of Co1 and BIK BCL2 genes in local Gorontalo chickens were carried out using real-time PCR. This study aims to detect the presence of Co1 and BIK BCL2 genes in local Gorontalo chickens so that they can be used as information on gene diversity that can be used as genetic markers to study the diversity of local chicken species in Indonesia. The method used in this study is the SYBR green real-time PCR method. From the research conducted, it was found that the concentration values of the extracted samples were in the range of 68.15 ng/μL-68.30 ng/μL. Meanwhile, the purity values measured at wavelength A260/A280 were obtained with purity ranges between 1.867-1.923. The results of the amplification of the target gene for the Co1 gene, the Ct value is in the range of 20.90-21.20, while for Tm it is in the range of 84.10-84.20. In the BIK BCL2 target gene analysis, the Ct value was in the range of 16.15-16.20, while for Tm it was in the range of 91.10-91.20. From these results, it can be concluded that all research samples were sampled from six different regions detected with CT and Tm values from the real-time analysis carried out obtained homogeneous values and no more than 2 degrees of difference between samples. A suggestion for further research is to explore more diverse genes so that more data on genetic diversity can be obtained.

Ct, Gorontalo chicken, MTSN gene, Tm

## **AO-07**

### **The adaptation top crosses of anthocyanins corn in lowland zone of Palu, Indonesia**

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Anthocyanins corn held to increase of human health, the color of seeds were orange to black. The experiment was to studied characters of some families as top crosses anthocyanins corn under interaction genotypes (G), and season (S) in valley of Palu in Indonesia. The experiment were conducted by randomized complete block design with three replication in experimental farm of Sidondo Palu Indonesia under two season rainy and dry condition. The ecology of Sidondo was lowland (<100 m above the sea) zone and climate was dry (rainfall less 500 mm per year). There are ten top crosses populations as anthocyanins corn as candidate included check to evaluated in two seasons (rainy and dry) on 2017. The genetic's material as population has been increase by intra population improvement. The objective of experiment was to study of characters and to find of which is genotypes was stable and high yield to promosing as candidate for F1 top crosses varieties. Genotypes were planted in four rows 5.0 m length, spacing 75 x 20 cm, one plant per hill, and applied fertilizer Urea, Ponska (300-200) kg/ha. The first analyzed was used of one factor (G) and continuing by interaction effect of G x S, S: Season. Genotypes would be selected by LSD test. The result shown that there are significant interaction G x S and founded the genotypes would be promising as new F1 candidate was PMU (S1) Synt.F.C1-2-3 x tester: PPH (S2) C2. The potential would be founded 6.0-7.0 t/ha, characters of candidate was scored one of plant aspect, ear and husc cover, position of ear height is middle of plant height, and there are 45 days for anthesis. The released would be develop under poor and ide geneous farmers for aims to increase income, health and anticipated of mall nutrition

Anthocyanins corn, GxS, lowland zone

**AO-08****Diversity of soil insect at Kutai National Park, East Kalimantan, Indonesia**

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Forests are a potential natural resource in supporting the diversity of flora and fauna. Kutai National Park is a low Dipterocarpaceae rain area that has a variety of potential flora with a number reaching 958 species, including 8 out of 10 genera in the Dipterocarpaceae family in the world. And one of the other resources in the forest is land surface insects. the presence of soil surface insects is needed to assist in the decomposition process. Diversity is one indicator of a community's stability. One resource that plays a role in the community is ground-level insects. The research was conducted in two locations, namely Sangkima and Prevab. The method used pitfall trap. The number of traps installed is 6 points with 12 traps. The traps were placed on a transect and carried out every week for four times. Samples were collected and identified to determine the species. Samples were identified at the Forest Protection Laboratory of STIPER East Kutai. The result found in the Sangkima area, 1989 individuals from 11 families and 8 orders were found, while in Prevab found 2324 individuals from 12 families and 9 orders. The dominant families in the Sangkima area are Scarabaeidae, Staphylinidae, Sphaeromatidae, Blaberidae while in prevab are the scarabaeidae family, formicidae family, and the Staphylinidae family. As conclusion the insect at prevab is more varied because of it has a different vegetation with sangkima.

Diversity, Kutai National Park, pitfall trap, soil insect

**AO-09****Genetic diversity of *Shorea stenoptera* in West Kalimantan (Indonesia) in comparison with other *Shorea* species**

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As one of *Shorea* species producing tengkawang in addition to its timber, *Shorea stenoptera* has been facing habitat loss and other disturbances which caused population decrease. Conservation efforts and genetic variation or diversity studies aiming at species improvement have been conducted by various institutions including private sectors by selecting plus trees for mother trees and conserving them in situ and collecting the wildings as the sources of superior planting materials. To ensure the wildings collected were from the plus trees parents, genetic relatedness and genetic similarity, in

addition to genetic diversity of plus trees and seedlings grown nearby the mature plus trees in several sites in West Kalimantan were assessed. The observed heterozygosity ( $H_o$ ) of *S. stenoptera* collected from Gelora Dayak Barat (GDB) and Mandor was 0.198 while expected heterozygosity ( $H_e$ ) was 0.338 assessed based on isozyme analysis. When these values are compared with DNA-based markers such as microsatellite marker for analyzing samples from Sintang, Sanggau and Ketapang of other research results, they were ranged from 0.532 to 0.696 and from 0.520 to 0.706, respectively. These results indicated that the genetic diversity of *S. Stenoptera* varied depending on the stage of growth of samples, sites and analysis used. The analysis could also differentiate the plus trees with different range of tree diameter and morphological characteristics as well as some wildings with the parents or the plus trees. Conservation strategy of *S. stenoptera* needs to be revisited in certain sites due to its low genetic diversity as compared to other *Shorea* species.

DNA-based markers, genetic diversity, isozyme, *Shorea stenoptera*, West Kalimantan

**AO-10****Extraction of secondary metabolites of *Trichoderma viridae* with various organic solvents and their potential for controlling of *Colletotrichum gloeosporoides* causes of anthracnose disease in chili in vitro**

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Secondary metabolite compounds produced by *Trichoderma viridae* have the potential to be developed as biofungicides to control pathogenic fungi that infect plant parts above the soil surface. The purpose of this study was to obtain the best organic solvent in suppressing the growth of *Colletotrichum gloeosporoides* which causes anthracnose disease in chili plants in vitro. The design used was a completely randomized design (CRD) with 3 treatments and 5 replications. The treatments were 2 types of organic solvents: A. ethyl acetate solvent, B. butanol solvent and C. control (sterile distilled water). Parameters observed were: 1). Colony area, 2). Colony diameter, 3). Number of conidia, 4). Conidia germination, and 5). Number of propagules. The data were statistically analyzed using analysis of variance and LSD further test at a 5% significance level. The results showed that ethyl acetate and butanol solvents were able to attract secondary metabolites produced by *T. viridae* which the function as antifungal. Both extracts had the same ability to suppress the growth of *C. goeosporoides* which included colony diameter, colony area, number of conidia, conidia germination and number of propagules.

*Colletotrichum gloeosporoides*, extraction, secondary metabolites, *Trichoderma viridae*

**AO-11****Potential, opportunities and constraints to develop tinombo local garlic, Central Sulawesi, Indonesia**

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The abundance of imported garlic has an impact on the decline of local garlic production. Indonesia still have to meet garlic's need by import about 97%. So far, there are five local garlic varieties which have been registered by the Ministry of Agriculture, namely Lumbu Hijau, Lumbu Kuning, Lumbu Putih, Tawangmangu Baru and Sangga Sembalun. Those five varieties are still being developed by local farmers, although in limited area. In 2018, garlic production was 39 thousand tons which it was twice of garlic production in 2017. Thus the availability of seeds also increases including the unregistered varieties which were developed by local farmers such as local garlic Tinombo. This variety has become a favorite variety of farmers in Ogoalas Village, Tinombo District, Parigi Moutong Regency, Central Sulawesi since apart from being a cooking spice, it is also used for biopharmaceuticals. A variety characterization was performed by the Central Sulawesi Agricultural Technology Study Center, the Tadulako University Faculty of Agriculture, the Central Sulawesi Seed Supervision, and the Certification Center Technical Implementation Unit. The results show that the Tinombo garlicks has light green leaf color, pale yellow tuber flesh color, very sharp/strong aroma, number of cloves per tubers vary from 14 to 21, production of 2-3 t/ha, potential yield of 7.6 t/ha, harvesting age of 5-6 months and suitable for planting in the highlands. The obstacles faced by garlic farmers in Ogoalas village are the access to the location which caused its price become expensive. The cultivation technology is still conventional and does not use fertilizers, either organic or inorganic. The planting area of each farmer varies between 50-100 m<sup>2</sup>.

Constraints, garlic, local varieties, opportunities, potential

**AO-12****Exploration of potential gene producing the most stable enzymes from the thermophilic microorganisms in Domas Crater, Mt. Tangkuban Perahu, Indonesia**

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Thermophilic microorganisms are microorganisms that have ability to survive and live in extremely high temperature habitat. Due to this special trait, thermophilic microorganisms have heat-resistant proteins such as thermostable enzymes and have been used in industry as biocatalysts. Some advantages of using thermostable enzymes in industry are reducing operating costs, increasing the reaction rate, thus increasing productivity, and environmentally friendly. Therefore, this research aims to isolate thermostable enzyme encoding gene and determine homology, differences in the sequence, and the closest relative of sample. The method used in this research is metagenomic approaches using random PCR techniques. Results that have successfully obtained from random PCR from the metagenome samples were cloned in the cloning vector then analyse nucleotide sequence (sequencing). The results obtained for the highest protein homology in samples 23 and 24 are Short-chain Dehydrogenase Reductase (SDR) oxidoreductase [*Caldivirgamaquilingensis*] of 58.58% and 58.02%, respectively. For sample 45, the highest protein homology is 3-dehydroquinone dehydratase Type I [*Metallosphaera*] with 79.88% similarity. The results of phylogenetic tree analysis of sample 23 have the closest relationship with sample 24. Meanwhile, sample 45 has the closest relationship with 3-dehydroquinone dehydratase Type I from *Metallosphaera* species. Analysis results of the distinguishing amino acid sequences for each sample is that sample 45 has the least amino acid sequences difference from NCBI database, compare to samples 23 and 24. This causes sample 45 has the greatest percentage of similarity in the NCBI database.

Thermostable enzymes, metagenomic approaches, protein homology, phylogenetics

**AO-13****Natural distribution of the genus *Dacrydium* (Podocarpaceae) in Central Kalimantan, Indonesia**

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The tropical coniferous genus *Dacrydium* Lamb. is widespread in Kalimantan, Indonesia. There are suspected four species that still exist on the island of Borneo. Even though it is considered globally as an Endangered and Least Threatened species by IUCN, in Central Kalimantan it is especially under threat from pressures related to logging, fire and land conversion. Locally known as Alau, this species prospers in a range of habitats from heath to deep-peat swamp forests in Central Kalimantan. The selection of our plot locations is based on the presence of natural Alau populations found in the selected forest areas. Data from field plots across four sites in Central Kalimantan are used to compare variations in habitat and species composition where Alau trees are growing. The results of the analysis showed that we could identify three species of Alau from



the four species that are suspected to exist in Kalimantan, namely *Dacrydium beccarii* Parl. (Alau Bakam); *Dacrydium pectinatum* de Laub. (Alau Kelangkang), and *Dacrydium elatum* (Roxb.) Wall. ex Hook. (Alau Tombak) with the presence of the species adjusted to the conditions of the habitat and the composition of the soil where this genus is occurring.

*Dacrydium*, deep-peat swamp forest, distribution, heath forest, natural distribution, Podocarpaceae

## AO-14

### Growth variation of ten swamp rice lines assembled of Universitas Bengkulu, Indonesia

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The utilization of swampland in Bengkulu Province has been considered for such a long time. Nevertheless, it is important to have adapted eminent variety over the land. The purpose of this research is to see the 10 lines of swamp rice growth as the assembling process of Universitas Bengkulu. This research is conducted from August to December of 2021 in shallow swamp land of Universitas Bengkulu. The research used randomized group environment design of this research is consisted of three repetitions, 10 lines of swamp rice UPBR 1 to UPBR 11 with Inpari 32 as the comparison. The the result of the research is analyzed by using ANOVA. If there is a significant different, it will be continued by using 5 % level of DMRT. The result shows that the plant height is significant different toward 2 MST and 8 MST. Approxiamtely, the most leaf amounts produced in UPBR 7 line with 81,61; The less leaf amount produced in UPBR 6 with 48,62; The average amount of top and bottom leaf stomata in UPBR 1 is 552,66 and 575,3. While the biggest amount reached by UPBR 11 on the top of stomata leaf is 1507 and UPBR 10 bottom part is 1426,33.

Lines, paddy, swamp

## Diversity of Species

### BO-01

#### Species composition and density of small-crustacean in the west and the east of Wallace line

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Small crustaceans are not a systematic group, they only share being crustaceans and being small, usually less than 25 mm in length. The Wallace Line is a faunal boundary line that separates the biogeographical realms of Asia and Wallace, a transitional zone between Asia and Australia. This study aims to compare species composition and density of small crustaceans found in the west and east of Wallace line. Data collection was conducted with artificial substrate from September to November 2018 in Bintan Island waters which represented the western of the Wallace line and from August to October 2019 in Gorontalo waters which represented the eastern of the Wallace line. Data analysis carried out in this study was species composition and species density. The number of small crustacean species found during the study were 21 species in Bintan waters and 21 species in Gorontalo waters. Only two species were found in both locations, namely *Acetes* sp. and *Gnорimosphaeroma* sp., so that 19 other small crustacean species (about 90.5%) differed between study sites. The species found with the highest density was *Neosesarma* sp. (90 ind/m<sup>2</sup>) in the waters of Bintan and *Sesarma* sp. (128 ind/m<sup>2</sup>) in the waters of Gorontalo. The results of this study indicate that there are differences in small crustacean species found in the west and east of the Wallace line. This can be an early indication that there is a potential influence of the Wallace line on the composition of small crustacean species in coastal waters.

*Neosesarma* sp., *Sesarma* sp., small crustaceans, Wallace line

### BO-02

#### Three trophic level of insect community based on sandalwood (*Santalum album*; Santalaceae) flowering phase in Tlogo Village, Nglanggeran, Gunungkidul, Indonesia

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This research was done at the peak of the flowering period of sandalwood which grows naturally in Nglanggeran, Gunungkidul, Yogyakarta in February 2015. The aim was to determine the insect community and the effect of variations of flowering sandalwood character of the insect community. Survey method used to select the group of stands and the individual which has the same floral colour

and flowering phase. The method used for observation, documentation and collection is direct sampling. Identification of insect held at the Laboratory of Entomology, Faculty of Agriculture, Universitas Gadjah Mada. The data was processed using Microsoft Excel and statistical analysis of correlation with SPSS version 25. The influence of flowering phase to community was measured by Multivariate ANOVA. The result showed that the insect communities consist of 7 orders and 23 families. All of them were grouped into three-trophic level by its role in sandalwood. Flower abundance was significantly influenced family Formicidae, Vespidae, Eumenidae, Syrphidae, Muscidae, Hesperidae, Nymphalidae; while stratum affected the Vespidae, Eumenidae, Scoliidae, Hesperidae, Pieridae, Nymphalidae. The direction and the phase did not significantly influence without any interaction with other factors.

Flowering phase, insect community, sandalwood, the effect of flowering, trophic levels

### **BO-03**

#### **Diversity and functional feeding group of insect families on waterfall ecosystem in Mount Lawu, Karanganyar Regency, Central Java, Indonesia**

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Insect adaptation ability on various habitats makes insecta have big diversity that become important role as environment indicator. Waterfall ecosystem have unique character with fast water flows, streams, and riparian zone around the waterfall. Insect diversity in waterfall ecosystem can leads to understanding the environment condition but only few research have done for it because there is not many waterfall ecosystem found. The aims of this research is to know the diversity and adaptation of insecta in waterfall ecosystem, also the environmental aspect of three tourism objects waterfall in Mount Lawu, Karanganyar Regency. Data observation of insect diversity took place on three waterfall; Parang Ijo, Jumog and Grojogan Sewu. Insect collected on 5x5m plot in 20 spot, 10 plot terrestrial and 10 plot on water river spots. Total 72 family insecta found from all the three sites, 48 family terrestrial insects and 36 family insects on water spot including 9 family of insect larvae. Index diversity of insecta according to Shannon-Weininger is Parang Ijo waterfall 1.33, Jumog 1.08, and Grojogan Sewu 1.30, meanwhile index diversity on water spots for Parang Ijo 1.5, Jumog 0.9, and Grojogan Sewu 2.0. The most abundant and various family is from order Diptera, while for larvae is order Ephemeroptera. Terrestrial insect most dominated by herbivore insects that feeds by plant vascular and flower. Functional Feeding Group (FFG) of insect larvae most found with feeding type gathering-collectors and scrapers. Composition of insect larvae FFG from three waterfall sites Parang Ijo, Jumog, and Grojogan Sewu shows that these waterfall are the

upstreams. The site characters of Parang Ijo and Grojogan Sewu shows a lot similarity from data vegetation, insects, and environmental parameter.

Abundance, environmental parameter, larvae, riparian zone, river

### **BO-04**

#### **Ecology of suweg (*Amorphophallus paeoniifolius*) in the Citanduy and Cimanuk Watersheds, Indonesia**

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Suweg (*Amorphophallus paeoniifolius* (Dennst.) Nicolson) is one of plant species which spreads in Indonesia, including in the Citanduy and Cimanuk Watershed. This research was conducted to observe the distribution, population, and habitat characteristics of the suweg in the Citanduy and Cimanuk watersheds. This research includes two stages, namely exploratory survey and intensive study. An exploratory survey was conducted randomly through direct observation to identify and record the distribution and population of suweg as well as biophysical environmental conditions. An intensive study was carried out to find out in more detail the ecological description of suweg in several areas of the two watersheds, namely Kuta Village, Ciangir Village, and Pasiripis Village, which was determined based on considerations of the existence of strategic projects, still strong local culture, and the discovery of suweg growing in the locations. Determination of the sampling plot for data collection is done by enumerating a number of lands where suweg grows and found visually based on researcher's observations. Parameters observed are suweg population, land type, elevation, soil pH, soil moisture, air temperature, air humidity, air pressure, light intensity, and the species of plants which found growing around the suweg. Suweg population data were analyzed by calculating the Summed Dominant Ratio (SDR). Other ecological parameters related to abiotic and biotic environments were analyzed descriptively. Based on the exploration results, suweg was found growing in several locations including the Citanduy and Cimanuk watersheds with certain elevations and environmental conditions. Based on the results of an intensive study, the SDR of suweg in Kuta Village, Ciangir Village, and Pasiripis Village in the home garden and garden, respectively, were 8.50 and 13.77; 10.07 and 19.25; and 0 and 22.92 which indicate the population or density of suweg is low. The abiotic and biotic environmental parameters observed at each location varied.

*Amorphophallus paeoniifolius*, Cimanuk and Citanduy Watersheds, ecology

## **BO-05**

### **Modification of sugar palm starch (*Arenga pinnata*) using microwave: Effect of moisture content and microwave power on physicochemical characteristics**

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Sugar palm (*Arenga pinnata* (Wurmb) Merr.) is a plant with many benefits for humans, which can be utilized to produce industrial materials such as sap, sugar palm fruits, and sugar palm starch. However, the native starch performs high viscosity, easy retrogradation problems, unstable to heat and acid, and low paste resistance. Therefore, modifying sugar palm starch is necessary to improve its physicochemical characteristics, which microwave is reported to be one of the effective modification methods. In this research, starch modification using a microwave was carried out at 13%, 18%, 23%, and 28% moisture content, with the microwave power of 200 W, 300 W, and 399 W. In general, increasing moisture content and microwave power could decrease starch, amylose content, and swelling power, while solubility increased. The higher power applied reduced the starch granules' size and changed the pasting properties characteristics. All the treatments in this research did not change the functional groups of the sugar palm starch.

Microwave power, modification, moisture content, physicochemical characteristics, sugar palm starch

## **BO-06**

### **Characterization and biological assessment of indigenous biofilm forming rhizosphosphate bacteria isolated from marginal soils**

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The maize growth and development on marginal are highly influenced by acidity or salinity of dry land ecosystem. The aim of research was aimed to screen, characterize and to assess the ability of selected Indigenous biofilm forming rhizosphosphate bacteria (BFRB) to produce the growth factor (IAA) and increase the maize growth. Tens composite soils samples were taken dry land acid

ecosystem (AE) and saline ecosystem (SE). Thirty isolates of rhizosphosphate bacteria were obtained based on the clear zone around the colony on selective pikovskaya agar media. Subsequently, the qualitative biofilm test was conducted and resulted 9 isolates of biofilm forming rhizosphosphate bacteria. Biological assay was done to measure the effect of selected BFRB on maize growth characters. The experiment was arranged as randomized block design, consisted of 10 treatments (control and 9 isolates of BFRB) and provided with 3 replications. The experimental results showed that there's three potential isolate of BFRB, either from AE or SE increased the maize growth significantly. The roots length, plant height and dry weight were significantly increased by the P1, P4 and P9 isolates of BFRB from saline soils and by the N5, N7 and N9 of BFRB from acid dry land. The isolates of P1, P4, and P9 isolated from saline soils were able to produce the maize height about 5.20 cm; 2.87 cm and 3.53 cm (325%; 179.4% and 220.6% higher than control), root length about 8.07 cm; 6.93 cm and 7.5 cm (141.6%; 122.2% and 132.2% higher than control) and maize dry weight about 1.94 g; 1.92 g and 1.92 g (120.5%, 119.3%, and 119.3 % higher than control) and the isolate N5, N7 and N9 isolated from acid dry soil were able to produce maize height about 18cm; 17cm and 12 cm (375%; 351% and 258% higher than control) root length about 6.63 cm; 6.15 cm and 9.13 cm (194.4%; 180.3% and 267.7% highr than control) and dry weight about 1.95 g; 1.97g; 1.92g (111.4%; 112.5% and 109.7% higher than control). This results concludes that these BFRM isolates can be used for developing the biofilm rhizosphosphate biofertilizers as bioagent to improve the productivity of maize on marginal soils.

Acid soils, BFRB, biofilm rhizosphosphate biofertilizers, marginal soils, saline soils, salinity

## **BO-07**

### **Understorey plant as honey bee forages of *Apis cerana* (Hymenoptera: Apidae) in Wanagama Education Forest, Gunungkidul, Indonesia**

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One of the important things for the sustainability of beekeeping depends on the availability of floral resources. Understorey has the potential as a food source for honey bees because it has a variety of flower shapes and flowering times. This study was conducted to find out the diversity of understorey species as honey bee forage for *Apis cerana* beekeeping in Wanagama Education Forest, Gunungkidul from November 2018 to April 2019. Data was collected by observation of understorey species and honey bees around the apiary location. Parameters measured were the abundance of plant species, flowering condition, and the number of honey bees. The result showed that 60 species (19 families) were potential as

honey bee forage and 12 species visited by the *A. cerana*. The understorey plant of *Zea mays*, *Passiflora suberosa*, and *Imperata cylindrica* were frequently visited by honey bees. Total of 276 individual honey bees were observed for foraging activity on the understorey plants. Frequency of honey bee visitation on understorey plant was significantly difference at three different observation time ( $\chi^2$ : 31.805; df: 2; p: 0.0001) with the highest in the morning ( $6.19 \pm 1.01$  individual) followed by afternoon ( $1.17 \pm 0.35$  individual), and in the evening ( $0.31 \pm 0.14$  individual).

*Apis cerana*, beekeeping, forest, honey bee forage, understorey plant

### **BO-08**

#### **Phylogenetic status of the giant frog (*Limnectes blythii*) based on 16S gene sequention in West Sumatera**

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This study aims to analyze the status of phylogenetic relationships based on the DNA sequence of the 16S RNA gene in West Sumatra. The sample came from a riverside location in the Malampah, Pangian and Harau Valley nature reserves in the Genetics and Molecular Biology laboratory, Department of Biology, Faculty of Mathematics and Natural Sciences, Andalas University, Padang. The amplified DNA (PCR) was sent to the MacroGen USA DNA sequencing laboratory in Korea. The results of the phylogenetic analysis of the *Limnectes blythii* complex in West Sumatra were divided into 2 clusters. The first cluster consisted of *L. blythii* populations from Pangian Malampah and Harau B in the first sub-cluster with all *L. blythii* from Thailand in cluster k-2. Meanwhile, the second cluster consisted of the entire population of *L. blythii* originating from Palupuh (POE), Harau (HA). The phylogenetic relationship of *L. blythii* from the Pangian and Harau Valley populations B was monophyletic with Malampah and closely related to sub-cluster 1 which was in sub-cluster. second as a sister clade. *Limnectes blythii* Harau A and Agam Valleys are in the third sub-cluster. *Limnectes blythii* in Asia and is a monophyletic lineage. Genetic differentiation has occurred from each population observed and is monophyletic with out group species. The genetic variation of *L. blythii* in three populations (Harau, Malampah and Pangian) was low. The genetic variation of *L. blythii* between populations was smaller than between populations and the genetic differentiation and gene flow between populations of *L. blythii* was moderate. *Limnectes blythii* complex has undergone conservative morphological evolution with a non-widespread distribution of species with a possible increase in the number of species due to high deforestation and human anthropogenic activities, resulting in ineffective gene flow. For this reason, the diversity of *L. blythii* that undergoes speciation and is

separated from species originating from Thailand should not be underestimated to reduce extinction. it is necessary to immediately make efforts to conserve biodiversity, in situ and ex situ involving the government, academia and the community.

Phylogenetic, speciation, status

### **BO-09**

#### **Ectoparasite diversity in crustachea cathees in Estuaria Segara Aanakan Cilacap, Central Java, Indonesia as an initial step of conservation**

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The Eustaria Segara Anakan Cilacap area is an environment that is rich in aquatic biological resources, such as crustaceans, namely crabs and shrimp. Mangrove crab and shrimp is a crustachea that has high economic value because it has a high protein content. Research has been conducted which aims to determine the diversity of Ectoparasites in the Estuaria Crustachea caught in Segara Anakan Cilacap, Central Java. This research method is a survey method with purposive sampling. The results of the study, the type of ectoparasites found in crabs caught in estuaria Segara puppies Cilacap is *Ichtyobodo* sp., *Octolasmis* sp., *Vorticella* sp. and shrimp is *Vorticella* sp., *Epystilys* sp., *Zoothamnium* sp. and *Ichtyobodo* sp. The ectoparasite biodiversity index captured by eustaria freshly grown Cilacap H: 0.51 in equilibrium or stable in growth / development. the diversity of ectoparasites in shrimp is low with a wealth of ectoparasite species found to be moderate. These results are a reminder of how conservation efforts are carried out as early as possible.

Crustachea, Cilacap, diversity, ectoparasite, estuaria

### **BO-10**

#### **Impact of introducing manage honey bee colony on wild bees diversity and abundance in agroecosystem**

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Honey bees and wild bees have a very important role in the pollination process of agricultural crops. However, many research results show that the diversity and population of wild bees continues to decline. In order to maintain the success of pollination, many managed honey bee colonies have been introduced to agricultural land, however, the introduction of honey bee colonies can cause a decrease in

the diversity and abundance of wild bees that naturally exist on agricultural land. The purpose of this study was to determine the effect of the introduction of honey bee colonies on the diversity of wild bees and their abundance on agricultural land for seasonal crops. This research was conducted using an experimental method with the treatment of honey bee colonies and cash crops. The results showed that the introduction of honey bees to agricultural lands the introduction of honey bee colonies (*Apis cerana* and *Apis mellifera*) affected the diversity and abundance of wild bees ( $p < 0.05$ ), the best diversity and abundance of wild bees occurred in the early and mid-flowering season. The highest number of wild bees were from the species *Amegilla zonata* and *Amegilla cingulata* ( $P=0.00 < 0.05$ ). Based on the results of data analysis, it can be concluded that the introduction of honeybee colonies has an impact on the diversity and abundance of wild bees and farmers can introduce honey bee colonies only at the beginning and middle of the blooming time.

*Amegilla cingulata*, *Amegilla zonata*, blooming time, colony, diversity, honey bees

## **BO-11**

### **Microbia diversity at re vegetation of post coal mining area: A study in Kutai Kartanegara Regency, Indonesia**

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Post-mining management of coal should be followed by revegetation. The success of revegetation activities is largely determined by the fertility status of the soil, which consists of chemical and biological fertility components. Biological fertility indicators of the presence of microbes and the number of soil microbes. The study aims to identify soil microbes in land after coal mining of palm oil vegetation and conduct an analysis of the relationship between the diversity of soil microbes and the chemical fertility rate of the land. The result shows that soil microbial diversity in rubber plantation and in oil palm plantation of post coal mining area in Kutai Kartanegara District, showed that there were 5 (five) fungal genera identified, namely: *Aspergillus* sp., *Trichoderma* sp., *Phytium* sp., *Penicillium* sp., *Fusarium* sp., While the genera of nematodes were founded are: *Rhabditis* sp., *Tylenchus* sp., *Helycotylenchus* sp., *Meloidogyne* sp., *Hemicyclopora* sp., *Rotylenchulus* sp., *Mononchus* sp., and *Radopholus* sp. Furthermore, there are 2 (two) genera of bacteria namely Azotobacteraceae dan Bacillaceae The number of microbes on land that is not post-mine is more than the number of mikrobia on former coal mining land. The chemical fertility of land after coal mining tends to be low, as well as biological fertility tends to be low. Chemical analysis of soil on pasca coal mining land showed soil acidity (pH) was 3.56; C Organik 2.08%; N total 0.17%, C/N ratio 12.24.

Bacteria, fungi, nematodes, post coal mining area

## **BO-12**

### **Mikroorganism population in reclamation and pre-mining area at PT Kaltim Prima Coal, East Kalimantan, Indonesia**

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Coal mining activities change environmental conditions physically, chemically and biologically. Repairing efforts to damage caused by mining must be carried out. To return the soil microorganisms, pre-mining data needed as reference. This study aims to determine the species of bacteria and fungi in the pre-mining and unrevegetated reclamation area at Kaltim Prima Coal Company. This research was conducted in April 2021. At each location, 20 point/ha of soil samples were taken and mixed evenly, than 100 g was taken and stored in a cooler box to keep it below 4°C. Bacteria and fungi were isolated by the spread plate method by serial dilution technique. The cultures were incubated at 28°C for 24-28 hours. The isolated fungi were then identified based on colony morphology and microscopic characteristics. The 24 hour old bacteria were stained and observed under a microscope. Then 16 biochemical tests were carried out, the data obtained were then referred to the Bergeys manual of determinative bacteriology to the genus level. The results of the study obtained 14 species of bacteria and 7 species of fungi at pre-mining and 3 species of bacteria and 2 species of fungi were obtained unrevegetated. The same bacteria that held at both location is *Bacillus* sp.

Microorganism, post coal mining, pre-mining, reclamation

## **BO-13**

### **The structure of plankton community at mangrove forest of Bontang Mangrove Park, Kutai National Park, East Kalimantan, Indonesia**

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Mangrove plays important roles in both coastal and terrestrial ecosystem, one of them is as a nutrient producer

by decomposing leaf litter that becomes essential nutrient for the organism in mangrove. The nutrient were used by plankton that also has important role in a waters. Plankton has a function ecology as primary producers and the beginning of the chain in food webs, so that Plankton is often used as a measure of water fertility. This study aims to determine the structure of plankton community at mangrove forest of Bontang Mangrove Park. This research was conducted in juli 2021. There were three station made. 100 ml water sample were taken from 100 litter sample of each station using plankton net and taken to the laboratory to identified. The result found 23 species of phytoplankton from 3 class and 12 species of zooplankton from 4 class. Diversity indices of phytoplankton were medium 1.92-2.71 so is the zooplankton 1.01-1.23, the evenness indices of phytoplankton were high between 0.63-0.96 so is the zooplankton 0.53-0.63, the species richness of phytoplankton is 1.59-2.11 and zooplankton 0.57-1.24 and species dominance in those three station for phytoplankton 0.074-0.264 and zooplankton 0.120-0.343 so there is no dominance in both phytoplankton and zooplankton.

Bontang mangrove park, community structure, phytoplankton, zooplankton

## BO-14

### Effect of non volatile extracts of *Citrus nobilis*, *C. amblycarpa*, and *C. aurantifolia* peels as antioxidants and benzyl amino purines (BAP) on in-vitro banana *Kepok* plant growth

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Several efforts have been made to inhibit browning in in vitro cultures of *Musa paradisiaca* L. by administering antioxidant compounds. This includes the use of phenolic and flavonoid compounds from the plants of the Rutaceae family such as Siamese orange (*Citrus nobilis*), citron (*Citrus amblycarpa*), and key lime (*Citrus aurantifolia*). Therefore, this research aims to determine the effect of the *C. nobilis*, *C. amblycarpa*, and *C. aurantifolia* peel extracts with benzyl amino purine (BAP) on Murashige and Skoog (MS) media. The parameters measured were height and number of shoots, as well as total leaves. The peel extracts were obtained by maceration of *C. nobilis*, *C. amblycarpa*, and *C. aurantifolia* peels residues using n-hexane, ethyl acetate, and ethanol as solvents. Furthermore, the inhibitory concentration of 50% (IC50) was determined by the 2,2-diphenyl-1-picrylhydrazyl (DPPH) method. The results showed that the n-hexane extract of *C. nobilis*, ethanolic

extract of *C. amblycarpa*, and the ethyl acetate extract of *C. aurantifolia* gave the highest activities with IC50 values of 0.47 mg/mL, 0.66 mg/mL, and 0.46 mg/mL, respectively. Meanwhile, the best combination treatment of *C. nobilis* peel extract and BAP for shoot height was at concentrations of N2B4 (450 ppm ECN + 9 ppm BAP), the number of shoots at N1B1 (250 ppm ECN + 3 ppm BAP), and the number of leaves at N1B4 (250 ppm ECN + 9 ppm BAP). The best combination treatment of *C. amblycarpa* peel extract and BAP for shoot height was at concentrations of A3B2 (650 ppm ECA + 5 ppm BAP), for the number of shoots at A1B2 (250 ppm ECA + 5 ppm BAP), and for the number of leaves at A3B2 (650 ppm ECA + 5 ppm BAP). Meanwhile, the best combination treatment of *C. aurantifolia* peel extract and BAP for shoot height was at a concentration of C2B2 (450 ppm EC + 5 ppm BAP), the number of shoots at C1B3 (250 ppm EC + 7 ppm BAP), and the number of leaves was at C3B2 (650 ppm EC + 5 ppm BAP) and C3B3 (650 ppm EC + 7 ppm BAP).

Antioxidants, *C. nobilis*, *C. amblycarpa*, *C. aurantifolia*, in vitro culture, *M. paradisiaca*

## BO-15

### Decomposition of three different leaf litter and meso-arthropods diversity at coffee agroforestry

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Arthropods have a substantial contribution to soil fertility through decomposition, humification, and mineralization. Arthropods community is part of decomposition process that could resulted on plant's nutrition. This study aimed to analyze nutrient release of the three different types of litter (leaf of coffee, eucalyptus, and goatweed) and the meso-Arthropods diversity. 360 litter bags were placed in the soil surface. Ten bags were collected every month and the litter bags were weighed. The meso-arthropods were collected by extracting each litter bag by Barlese-Tullgren methods. The soil under the litter bag was sampled and then analyzed for its chemical content. These experiments were conducted for 6 months (from November 2020 to April 2021). The results showed that the decomposition rate of the three types of litter was significantly different. The average mass reduction of leaf litter during 6-months was 50.23%, 45.79%, and 88.65% for coffee, eucalyptus, and goatweed, respectively. The highest meso-arthropod species richness found in February at coffee and eucalyptus however at goatweed litter the highest was in December 2021, which were 64, 63, and 48 species, respectively. During six months the fastest decomposition was at goatweed and chemically the nutrient release from the litter was Potassium and Boron.

Barlese-Tullgren, nutrient release, species richness

**BO-16****Status and distribution of Indonesian freshwater Bivalvia based on collections deposited in the Museum Zoologicum Bogoriense**

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The research and discovery of freshwater Bivalvia in Indonesia have been started since the 1800's. Dozens of species have been reported from various regions in Indonesia. But, the information of distribution, systematic nomenclature changes, validity of current name and invasiveness are poorly updated. Even there were publications about new species that become the last publications of their existence as well. Based on scientific specimens deposited in the Museum Zoologicum Bogoriense (MZB), there are 28 species of freshwater bivalves belong to four families (Cyrenidae, Unionidae, Hyriidae, Sphaeriidae). Fifteen species of which have a type locality from Indonesia. Furthermore, there are at least five species reported from restricted area and considered as an endemic species (*Corbicula loehensis*, *C. manilensis*, *C. matannensis*, *C. linduensis*, *C. towutensis*). Species of *Rectidens sumatrensis* and *Batissa violacea* are known to be widely distributed in Indonesia. Furthermore, the unionid *Sinanodonta woodiana* that invaded in 1970's currently become a common species in local streams.

Endemic, distribution, freshwater Bivalvia, scientific specimen, systematic nomenclature, status.

**BO-17****Isolation and decolorization of indigenous bacteria prevent the waste pollutants textil with eco friendly**Rena Erlianisyah Putri<sup>1</sup>, Indah Primadona<sup>2</sup>, Nia Rossiana<sup>1</sup><sup>1</sup>Microbiology Laboratory, Departemen Biology, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran. Jl. Raya Bandung-Sumedang Km. 21 Jatinangor, Sumedang 45363, West Java, Indonesia<sup>2</sup>Science and Technology Research Center. Jl Raya Puspiptek, Tangerang Selatan 15315, Banten, Indonesia

Process of the boiling is the one of making fabric material to produce the waste that can not be dissolved. The one of effort to handle the industrial waste is involving the microorganism of decolorization. In commonly, the using management of waste use with coagulation and filtration. But this management produce side waste like sludge. The using potency of microorganism is developing of all the aspect in life. The degradation with eco friendly and doesn't produce side waste. This microorganism has important role at the cycle of biogeochemistry and living of metabolism in the world naturally. It have a capability to reduce the toxic compound and many pollutants. It can have benefit in bioremediation. All of those of

microorganism is a part of biodiversity of Indonesia. It can isolated from cover land and the ocean. Isolate of potential microorganism can isolated from industrial waste, include industry of textil (Mohandass et al. 2007). Isolated bacteria of indigenous from the waste is the bacteria which have ability the good adapt in waste condition, it have enzyme activity for decolorization process to change into the simply compound. It can be separated onto source of nutrition for its development (Mayanti dan Hertto 2009) This research means get isolate of potential bacteria to decolorize waste textil. The bacteria is isolated from the land in waste textil area at Bandung city. Getting isolate of bacteria with the growth of sample in Nutrient Agar Medium. That isolate will grow and identified in morphology form. This research to get indigenous potential bacteria and to know the optimum condition for decreasing the pigment from the waste textil. The decolorization using the concentrate of 50, 100 and 200 mg/L with Submerged Fermentation (SmF) or submerged fermentation, according Hernandez (2008) and Bergsten-Torralba (2009). The efficiency of decolorization from the various of concentration follow the comparison of pigment from starting concentration in % form. Finally, getting the genus *Bacillus* spp, it can reduce the level of pigment until 90% at the concentration pigment at 100 mg/L.

Indigenous bacteria, decolorization, eco friendly, waste of textil

**BO-18****Effect of grazing on  $\alpha$  and  $\beta$  diversities of vegetation and soil seed bank**

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In the present study, we hypothesized that grazing could increase the heterogeneity and species turnover of vegetation, while the effect of grazing on species turnover of soil seed bank was non-significant or less pronounced. The study was carried out at Northern Iran in alpine grassland habitat. Therefore a total of 80 2x2 mplots (40 in the grazed and 40 in the ungrazed areas) were random-systematically established and soil samples were then collected from each plot. Above-ground vegetation composition was also determined in each plot during the growing season. According to Anderson et al. (2011) and Bartha et al. (2011), we estimated diversity (spatial turnover that represented by the mean Bray-Curtis index) and  $\alpha$  diversities in each plot in grazed and ungrazed areas. The results showed that  $\beta$  diversity of vegetation was higher, and that of the seed bank was lower for grazed than ungrazed plots. Grazing led to a decrease in  $\alpha$  diversity in both vegetation and soil seed bank.

Sheep grazing, soil seed bank, species turnover

**BO-19****Comparison of plant diversity after 10 and 15 years revegetation at post coal mining area in East Kalimantan, Indonesia**

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Coal mining is a major activity that causes changes in plant and organism biodiversity, soil profile and geological structure permanently by leaving large overburden areas. Considering the impact of mining on the environment, post-mining areas need to be rehabilitated by conducting reclamation and revegetation. To know the succession of plant diversity of revegetation area, a monitoring and vegetation analysis were needed. The objective of this study was to compare plant diversity after 10 and 15 years revegetation in coal mining reclamation site in East Kalimantan. To restore plant diversity, the coal mining company began by planting pioneer legume and fast growing species, after three years they plant a local species such as dipterocarps. Vegetation sampling was conducted in 20 plots measuring 20x20 m<sup>2</sup> along line transects, with 100 m distance between plots. As a study result a total of 98 plant species were found in the reclamation site, consisting of 78 tree species and 20 herbaceous species, in a meanwhile at 10 years old revegetation area and at 15 years old revegetation area, a total of 102 species consisting of 75 tree species and 27 herbaceous species. Tree species diversity index in the both reclamation and herbaceous plants were relatively similar.

Diversity, post coal mining, reclamation area, vegetation

**BO-20****Relationship of leaf type and productivity in sweet potato clones**

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Establishment of new high yielding varieties of sweet potato with high yield potential in order to increase productivity. The productivity value of sweet potato depends on the photosynthate produced by the leaves as a source and its translocation to other plant organs as sinks. This study aims to determine the effect of leaf type on the productivity of sweet potato. The study was conducted in Jambegede, Malang in July-November 2019 and was compiled using a one-factor randomized block design with leaf type as treatment and repeated three times. The leaf type consists of five kinds, namely: kidney-shaped, cordate, triangular, hastate, and lobed. The variables observed in this study were: leaf length, petiole length, tendril length,

tendrils diameter, number of tubers (large, medium, small), tuber weight (large, medium, small), weight per tuber (large, medium, small), tuber weight per plant, tuber length, tuber diameter, tuber dry weight content and harvest index. The variable value for each leaf type is the result of the average variable value of 3 clones with the same leaf type. Sweet potatoes with heart-shaped leaves (cordate) tend to have higher productivity levels than sweet potatoes with kidney-shaped, triangular, spear-shaped and lobed leaves.

Leaf type, productivity, sweet potato

**BO-21****Diversity of bird species in Pangheotan Grassland, West Bandung Regency and Mount Masigit Kareumbi Hunting Park, Bandung Regency, Indonesia**

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The diversity of bird species is often used as an indicator of the ecosystem balance of an area. One of the efforts to preserve and protect the diversity of bird species is done by fostering habitat in the Pangheotan I Grassland PTPN VIII West Bandung and the Mount Masigit Kareumbi Hunting Park (Taman Buru Gunung Masigit Kareumbi herein after TBGMK) Wali Pohon Block. This study aims to determine the diversity of bird species in the two areas so that it can be used as basic data in making planning strategies for maintaining and increasing biodiversity. Bird data collection techniques using the point count method and analysis of bird species diversity data was carried out using a quantitative data analysis approach. In the second year of habitat development, 27 species of birds were found in Pangheotan grassland, with a Shannon-Wiener diversity index ( $H'$ ) of 2,479 (medium diversity), an evenness index of 0.814 (even abundance), and cucak kutilang (*Pycnonotus aurigaster*) was the type of bird that had the highest relative frequency and relative abundance. Meanwhile, in the second year of habitat development in TBGMK, 45 species of birds were found with  $H'$  of 3,237 (high diversity), and  $E$  of 0.926 (even abundance), and srigunting kelabu (*Dicrurus leucophaeus*) was the type of bird that had the highest relative frequency and relative abundance. The results of the study in the grassland showed that there were two additional bird species and an increase in the value of the Shannon-Wiener diversity index and the evenness index compared to the previous year. previously. This shows the success of the habitat development carried out in these two locations.

Biodiversity, bird species, habitat development, planning strategies



**BO-22****Macrofungi inventory in Sekipan Tawangmangu Forest Area, Karanganyar, Central Java, Indonesia**

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The hatching of sea turtle, *Batagur borneoensis* (Schlegel & Muller, 1844), eggs at information home tuntong, is one the final efforts to save this species from extinction. The aim of this study was to investigate the rate of hatching success of removed eggs from their natural nest to the incubation facility as well as the morphometric development during the nursery period. The search for the turtle nest locations, number of nest and clutch size per nest took place between September and November in Pusung Kapal Village, Seruway Subdistrict, Aceh Tamiang, Indonesia. The eggs were collected at night and placed at the incubation station the following morning. Number of eggs incubated and number of hatched eggs were recorded. The hatchlings were fed with natural food kale in a nursery pond before released to the wild at mouth Tamiang river. The young turtle growth indicators including body weight, carapace and plastron width and length were measured monthly for three months. Thirty-six nest and total of 552 turtle eggs were found five different nest locations i.e., Pusung Tengah, Pusung Cium, Pusung Putus, at the back of Pusung Cium and Mercusuar Lama. Totally 76,3% of the incubated eggs hatched after  $75 \pm 4$  days of incubation period. After three months in average the turtle youngs gained 65,1% in weight, 36,6% in carapace width, 33,1% in carapace length, 46,3% plastron width, 27,5% in Plastron length and 23,2% in body height. In conclusion, the egg hatching rate is potential to be increased and the growth rate was best predicted by body weight.

*Batagur borneoensis*, egg hatching, growth indicators, Pusung Kapal

**BO-23****Bird Diversity in *Ficus* spp. in the Kuningan Lowland Forest, West Java, Indonesia**

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The group of fruit-feeding birds is an important group in the tropics, as a dispersal of tree seeds so as to create a wide diversity of plant. The existence of birds depends on

the availability of food. This research was conducted in lowland forest which is a secondary natural forest. The purpose of this study was to determine the diversity of birds in several species of fruiting *Ficus* trees. Using the concentration count method at three tree observation points, namely *Ficus benjamina*, *Ficus sinuata* and *Ficus kurzii*. The results of this study indicate that the diversity index value ( $H'$ ) of birds in some *Ficus* trees varies. In *F. benjamina*  $H' = 2.25$ , *F. sinuata*  $H' = 2.31$  and *F. kurzii*  $H' = 2.5$ . But overall the diversity of bird species is of moderate value. The bird species *Pycnonotus simplex* (Pycnonotidae) is the dominant bird in *F. benjamina* and *F. kurzii*, while the bird species *Megalaima australis* (Megalaimidae) is the dominant bird on the *Ficus sinuata* tree. These birds are small birds that use fruit and insects as food. There is a species of bird whose conservation status is threatened (endangered), namely the *Zosterops flavus* species which is very rarely found in the location. Information on bird diversity is very important for area managers as a basis for species conservation-based area management

Aves, *Ficus*, fruit eater, lowland forest

**BO-24****Effect of bromelain enzyme in artificial feed to stimulate growth of bileh fish (*Rasbora* sp.) in the context of domestication of Aceh local fish**

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This study aims to determine the effect of adding bromelain enzyme in artificial feeds on the growth of Bileh fish (*Rasbora* sp.) in the context of domestication of Aceh local fish. The research method is experimental and uses a completely randomized design (CRD), consisting of 4 treatments (P) with 3 replications. The treatment given was the addition of bromelain enzyme with different doses in artificial feed, namely: 0.0 gr/kg (control/P1), 0.05 gr/kg (P2), 0.1 gr/kg (P3) and 0.15 gr/kg feed (P4). The research phase includes preparation of containers, treatment feed, fish rearing, and data collection. Parameters taken and evaluated include: specific growth rate (SGR), absolute length growth (ALG), feed conversion ratio (FCR), feed efficiency (FE), survival rate (SR) and water quality parameters. Data processed and analyzed with statistics (Anova). The results of statistical analysis showed that the addition of bromelain enzyme in artificial feed had a significant effect on SGR, ALG, FCR and FE ( $P < 0.05$ ), but had no significant effect on survival ( $P > 0.05$ ).

Bileh fish, bromelain enzyme, feed, growth

**BO-25****Endophytic fungal communities associated with root of *Paphiopedilum javanicum* in Mount Lawu, Java, Indonesia**

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Cultured and morphological-based identification and High-throughput sequencing (HTS) was applied to compare the fungal species inhabiting roots among samples of *Paphiopedilum javanicum* in Mount Lawu, Java. Surface sterilized root segments of *P. javanicum* were cultured in PDA. Genomic DNA from each sample was isolated using Plant Genomic DNA Mini Kit from Geneaid and ZymoBIOMICS DNA Miniprep Kit from Zymo Research. DNA concentration was determined using NanoDrop spectrophotometers and a Qubit fluorometer. Library preparations were conducted using Kits from Oxford Nanopore Technology. Isolation and cultured root samples in PDA result two isolated of the genus *Fusarium*, and *Aspergillus*. It's challenging to identify the fungal isolates to species level with morphological characteristics. Oxford Nanopore Technology sequencing of *Paphiopedilum javanicum* samples yielded 165 016 reads with an average read length of 688 nucleotides. Taxonomic analysis of metagenomic reads indicated that the fungal communities were diverse and strongly dominated by Ascomycota with *Fusarium* (37%). We found three common genera of orchid mycorrhiza, i.e., *Tulasnella*, *Ceratobasidium*, and *Serendipita* detected, yet in a small percentage. Therefore, the HTS method provides a good alternative for investigating the fungal communities than traditional cultured-based method.

Endophytic fungi, high-throughput sequencing, *Paphiopedilum javanicum* *Fusarium*

**Diversity of Ecosystem****CO-01****Arbuscular mycorrhizal effect on biodiversity of soil mesofauna and microbes in rhizosphere of *Ipomoea reptans***Anne Nurbaity<sup>1</sup>, Amin Mbusango<sup>1</sup>, Syamsu Alam<sup>2</sup><sup>1</sup>Faculty of Agriculture Universitas Padjadjaran. Jl. Raya Bandung-Sumedang Km 21 Jat inangor, Sumedang 45363, West Java, Indonesia<sup>2</sup>Faculty of Agriculture, Universitas Halu Oleo. Kampus Hijau Bumi Tridharma, Kendari 93231, Southeast Sulawesi, Indonesia

*Arbuscular mycorrhizal* fungi (AMF) play important role in improving soil quality. These fungi known to have positive effect in increasing the production and yield of vegetable crops, but its effect to the biodiversity of soil biota has not been widely reported. The purpose of this

study was to study the effect of AMF application on mesofauna and microbial biodiversity in the rhizosphere of vegetable crops in Andisols. Mycorrhizal and non-mycorrhizal plots was set up planted with the *Ipomoea reptans* Poir. Results showed that the AMF treatment had Shannon-Wiener index (H') 0.73 while in plants without AMF had lower Shannon-Wiener index (0.39). Plants treated with AMF showed higher plant height, number of leaves, fresh weight, uptake of NPK, and mycorrhizal root colonization. AMF improve the biodiversity of soil mesofauna, however it seemed to suppressed *Azotobacter* and Phosphate Solubilising Bacteria population. There was possibility that AMF related to the predatory mechanism between mesofauna and microbes in soil.

Andisols, *Arbuscular mycorrhiza*, biodiversity, *Ipomoea reptans*, soil biota,

**CO-02****Comparative study of Pb absorption ability in five shade plants species in West Cikarang Industrial Estate and Bekasi Urban Forest, West Java, Indonesia**Dayana Zulfadillah Intan<sup>1</sup>, Ratna Yuniati<sup>2</sup>, Retno Lestari<sup>2</sup><sup>1</sup>Postgraduate Program of Biology, Department of Biology, Faculty of Mathematics and Natural Science, Universitas Indonesia. Jl. Lingkar UI, Depok 16424, West Java, Indonesia<sup>2</sup>Departement of Biology, Faculty of Mathematics and Natural Science, Universitas Indonesia. Jl. Lingkar UI, Depok 16424, West Java, Indonesia

The growth of transportation and industrial sectors have an antagonistic impact on environment. One of the most common pollutants resulting from transportation and industrial activities is lead (Pb). Shade plants are used as biological agents to reduce Pb contamination in the air. This study observed leaf Pb absorption from five species of shade plants at two different sites. Ketapang (*Terminalia catappa* L.), mahogany (*Swietenia macrophylla* King.), trembesi (*Samanea saman* (Jacq.) Merr.), mango (*Mangifera indica* L.), and rambutan (*Nephelium lappaceum* L.) were selected as research objects. Bekasi urban forest and West Cikarang industrial state were selected as research sites. The objectives of this study were analyze the ability of five plant species to absorb Pb and analyze the correlation between Pb absorption with peroxidase enzyme activity and chlorophyll content. Lead absorption from shade plants may affect the peroxidase enzyme activity and chlorophyll content. Pb absorption was analyzed by Atomic Absorption Spectroscopy (AAS) and the peroxidase enzyme activity and chlorophyll content were analyzed using spectrophotometer. The ANOVA results showed that Pb absorption by plant species and research sites was not significantly different (sig.>0,05) Ketapang had the highest average Pb absorption (7.24 µg/g), followed by mahogany (5.44 µg/g), mango (3.4 µg/g), trembesi (3.17 µg/g) and rambutan (2.33 µg/g). The correlation and regression analysis showed that Pb absorption had no significant effect on chlorophyll content (0,173>0,05) and the direction of its correlation was

negative (-0,317). The correlation and regression analysis showed that Pb absorption significantly affected peroxidase enzyme activity ( $0,028 < 0,05$ ) and the direction of its correlation was positive (0,490). Different shade plant species and research sites did not have significant effect on Pb absorption. Pb absorption had no significant effect on chlorophyll content but significantly affected peroxidase enzyme activity.

Air pollution, chlorophyll, lead (Pb), peroxidase enzyme, shade plant

### CO-03

#### Potential management of Tembawang Kampung Lama ecosystem as natural attractions in Sanggau Timur Forest Management Unit, West Kalimantan, Indonesia

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Tembawang, a land management system for the Dayak community, a miniature tropical forest, can become a natural tourist destination. The purpose of the study was to assess the potential for the management of Kampung Lama tembawang as a natural tourist attraction in the Sanggau Timur FMU. The research was conducted using a survey method, and data collection was carried out by distributing questionnaires to the public, in-depth interviews, FGDs, observation, and document analysis. Assessment and analysis of data are based on guidelines from the Director General of Forest Protection and Nature Conservation (PHKA), 2003 concerning Criteria for Assessment of Tourism Objects and Attractions according to the Guidelines for Analysis of Operational Areas of Natural Tourism Objects and Attractions (ADOODTWA). The results showed that Kampung Lama tembawang has the potential to be developed. The Tembawang ecosystem has the main elements in the form of tourist attractions, supporting infrastructure and availability of clean water are in the good category, while the supporting elements in the form of accessibility are in the moderate category, the socio-economic environment and accommodation are in a bad category. The development of tembawang as a tourist attraction must be supported by accompanying tourist objects in the vicinity, and tour packages are made to attract more tourists to visit.

Dayak, Forest Management Unit, Natural attraction, Tembawang, tourist

### CO-04

#### Long tailed macaque (*Macaca fascicularis*) social network and diet proportion in Djuanda Forest Park, West Java, Indonesia

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The long-tailed macaque is a social animal with complex social organization. Its wide distribution and human expansion result in overlapping habitats. Djuanda Forest Park is one of them. Human activities in the area provide anthropogenic foods for macaques. This study aims to identify macaques' dominance hierarchies, non-social behavior differences, and consumption proportions of natural and anthropogenic food based on sex and age. Behavioral data were collected using scan sampling. Five colonies were observed with a population size of 170 individuals. Social behavior roles and non-social behavior differences were tested using chi-square. Social behavior was analyzed using Social Network Analysis (SNA). Food consumption differences were tested using the chi-square. There were role differences in aggression ( $p=1.9 \times 10^{-5}$ ) and mating ( $p=1.6 \times 10^{-5}$ ). The aggression and grooming network show a star-shaped structure. The mating network shows a triad structure. Playing network shows chain structure. SNA indicates a hierarchy with male adults at the top. There were no differences in non-social behavior ( $p=0.3$ ). There were differences in food consumption proportion ( $p=4.7 \times 10^{-10}$ ) with higher anthropogenic foods consumption. Higher anthropogenic foods consumption potentially leads to human-wildlife conflicts. This study concludes that male adults occupy the highest hierarchy, no difference in non-social behavior, and higher anthropogenic food consumption.

Anthropogenic food, natural food, non-social behavior, social behavior, social network analysis

### CO-05

#### Acclimation and propagation studies of *Smilax nageliana* an endemic plant

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*Smilax* L. species, popularly known in Indonesia as Canar, have been used in folk medicine as tonic against rheumatism and as anti-syphilitic. However, until today, their roots have been explored in an extractive way. *Smilax nageliana* A.DC is an endemic plant belongs to the family smilacaceae and distributed in Ranu Darungan, Bromo Tengger Semeru National Park, and Mount Kawi, East Java. The aim of this study was to analyze the propagation of *S. nageliana* aiming to meet the demand and to propose procedures for its sustainable management. The study was conducted with three treatments with ten replications each. Data analysis was carried out with statistics using a two-

way Anova design model. It were analyzed the shoot growth, including shoot height and number of leaves, as well as leaf chlorophyll content. The best shoot growth was achieved under acclimatized conditions in a temperature-controlled greenhouse. Meanwhile, the best leaf chlorophyll content is in natural habitat with shaded light. Stem cuttings of *S. nageliana* have a one hundred percent survival rate in controlled acclimatization areas of the greenhouse and natural habitat with shaded light.

Acclimation, endemic plant, propagation, *Smilax nageliana*, stem cuttings

## **CO-06**

### **Tree canopy cover for microclimate temperature reduction in Bandung city, West Java, Indonesia**

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The high level of urban development causes urban green areas to decrease and the built-up area to increase, this causes most cities to face the urban heat island (UHI) problems so that UHI mitigation becomes important in urban planning and design. The presence of trees can reduce the effect of the UHI, some cities want to increase urban vegetation to minimize the effect of UHI. Through evapotranspiration and the benefits of shade, urban trees are an important tool for making cities more resilient to extreme heat. This research was conducted in the city of Bandung by calculating the value of the Land Surface Temperature (LST) and the Normalized Difference Vegetation Index (NDVI). LST and NDVI values are obtained through the interpretation of satellite imagery, namely Landsat 8. The results of the calculation and determination of temperature distribution and vegetation density values in Bandung City are analyzed for trends and distribution of affected areas. Then it is analyzed how to increase green open space that has the capacity to absorb carbon, reduce local temperatures and biodiversity in urban landscapes. There is a decrease in vegetation density and soil surface temperature, which is evident in the increasingly warm development in the city of Bandung. There are 16 locations in the city of Bandung that have surface temperatures above 35°C which must be handled immediately with several alternatives according to conditions in the field with the approach of multiplying vegetation. The concept of planting trees here is trying to be developed in urban areas, especially in urban forests. The definition of urban forest refers to the Food and Agriculture Organization (FAO) as "a network or system consisting of all forests, tree groups, and individual trees located in urban and suburban areas". The term covers everything from gardens with trees with biodiversity in

mind. Some alternatives that can be applied are planting trees in areas with temperatures above 35°C, planting above the buildings (green roofs) and green walls (green faced/living wall). This concept can be applied in urban areas to reduce the temperature of the microclimate and biodiversity, besides having ecological benefits, it can also have economic value. Based on the results of research, the presence of plants can reduce the temperature between 2-4°C depending on the area of plants and the proportion of trees.

Microclimate, tree canopy cover, urban

## **CO-07**

### **Analysis of the diversity and evenness of mangrove ecosystems in the Pacitan Coast, East Java, Indonesia**

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Indonesia has a high mangrove diversity with 48 species of true mangrove plants that can be found. Mangrove grows along the coastline of Indonesia's island, one of which is situated on the southern coast of East Java. Pacitan, which belongs to the south coast and has 70,709 km<sup>2</sup> of coastline, is an area with the potential to have a diverse of mangrove vegetation. The existence of mangroves plays a role in carbon sequestration and the stability of coastal ecosystems. This study aims to determine the mangrove diversity index, the evenness diversity index in the southern coast of Pacitan. This research was conducted on November 2021 in four locations, namely the Telengria estuary (2 areas), Grindulu and Tawang Beach. Data was collected using a plot of 10 x 10 meters for trees, 5 x 5 meters for saplings, and 2 x 2 meters for seedlings. The data obtained were analyzed using the Shannon Wiener and Simpson index to calculate the mangrove diversity index as well as diversity and evenness indices. There are 7 species of mangroves (6 species of major and 1 species minor mangrove), 2 species of associated mangroves and 1 palm species, with the domination of *Rhizophora stylosa*. The results of the Shannon Wiener diversity index calculation show that the mangrove diversity index in the research area is classified as moderate. In addition, the Simpson dominance value and the Evenness Index present that the mangrove dominance value on the Pacitan coast is low with a very uneven category.

Diversity, evenness, mangrove ecosystem, Pacitan

## Ethnobiology & Socioeconomics

### DO-01

#### Knowledge and attitudes of local people against water pollution in the Martapura River, Banjar Regency of South Kalimantan, Indonesia

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Knowledge and attitudes will influence community involvement in designing sustainable biodiversity conservation and pollution control strategies. This study aims to explore the knowledge and attitudes of local residents towards water pollution in the Martapura River, Banjar Regency, South Kalimantan, Indonesia. The sample of this research is the population of three villages as many as 95 people who use the Martapura River a lot and work as students, civil servants, traders, housewives and freelancers/daily/laborers using the Stratified Random Sampling method. The results showed that there were four types of activities that pollute the waters, namely: 1) tofu factory industrial waste (33%), 2) abandoned garden waste (28%), 3) agricultural waste from rice field (24%) and 4) domestic waste (15%). The highest composition of respondents is casual/daily/labor (58%), followed by housewives 14%, traders 13%, students 9% and civil servants 6%. The level of public knowledge of water pollution is high (78%). Likewise with the attitude where 84% of local people said they did not agree with water pollution. Identification of environmental carrying capacity against water pollution in martapura river is needed to create a sustainable waste management strategy.

Attitudes, knowledge, local people, pollution, water

### DO-02

#### Local knowledge and development potential for suweg (*Amorphophallus paeoniifolius*) in the Citanduy and Cimanuk Watersheds, Indonesia

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Indonesia is a country that has very diverse ethnic groups and natural resources. Each ethnic group has the experience of interacting with the surrounding environment which may differ from one another. Generally, the experience of interacting gives birth to local knowledge. Suweg (*Amorphophallus paeoniifolius* (Dennst.) Nicolson) is one of the biological natural resources that grows in many parts of Indonesia, especially in watershed ecosystems. In general, residents have used suweg for various purposes of their life. The Citanduy and Cimanuk watersheds are areas in Indonesia, where there is suweg grows and is used by the resident. The watersheds are important watersheds for several reasons, such as the existence of vital objects and indigenous community. The study aims to document the local knowledge and development potential for suweg in the Citanduy and Cimanuk watersheds. This research uses mixed methods with dominant qualitative. Data were collected purposively through interviews with residents who were considered to have certain competencies regarding suweg. The informants in question include the owners of the land where suweg grows, farmers, and community leaders. The data were analyzed descriptively with an emic-ethical approach. The results showed that the resident had certain knowledge about suweg, namely living in various environmental conditions, being used for additional food and fish feed, and being managed on agro-ecosystem land. In addition, suweg has the potential for development based on sociological and ecological facts.

*Amorphophallus paeoniifolius*, Cimanuk and Citanduy Watersheds, development potential, local knowledge

### DO-03

#### Local knowledge on remnant water birds of *Ardeola speciosa*, *Egretta garzetta*, and *Bubulcus ibis* among people of Rancabayawak Hamlet, Gedebage District, Bandung, West Java, Indonesia

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In the past wetland of rice field of Gedebage area, Bandung of West Java had a rich of waters birds. Recently some wetlands of rice field have been rapidly converted to other

land use types, such as new settlements. Consequently, some water bird species have dramatically decreased. At the present time, only three species of wetland birds of Family Ardeidae, namely *Ardeola speciosa*, *Bubulcus ibis*, and *Egretta garzetta* have been still occurring in the wetland of Gedebage, Bandung. Three species of Ardeidae have special habitat for both night resting and breeding place in the bamboo trees of Rancabayak hamlet as enclave area of wetland of rice field of Gedebage. Aim of this research was to assess local knowledge or traditional ecological knowledge of Rancabayak people on three wetland species of Family Ardeidae, *Ardeola speciosa*, *Bubulcus ibis*, and *Egretta garzetta*. Method used was mixed-method of qualitative and quantitative. Some field techniques, namely observation, deep interview with informants, and structure interview with respondents were employed in this study. The results of study showed that on the basis of folk classification, three wetland birds of Ardeidae were classified by Rancabayak people based on feather colors, size and shape of body, and other characteristics. Based on the people perception, three wetland birds of Ardeidae, have ecological, socio-economic and cultural functions. Some factors have been identified as disturbances to three wetland species of Ardeidae in Gedebage, Bandung, including conversion of the wetland of rice field to other land use types, such as new settlement; and various bad behavior of people on such birds, including exploding the firecrackers. The loss of wetlands bird species diversity in Gedebage, Bandung can also lead to the loss of local knowledge of the people on wetlands bird species as one of important components of the wetland in semi-urban ecosystem of Bandung, West Java.

*Ardeola speciosa*, *Bubulcus ibis*, *Egretta garzetta*, local knowledge, wetland ecosystem

#### **DO-04**

##### **Hunting of wild animal by Saubeba Village's Community North Manokwari District, Manokwari Regency, West Papua, Indonesia**

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Hunting is a way to harvest wild animal from nature. The hunters must know the rule to hunt effectively and efficiently. This study aims to determine the rules of hunting wild animal by Saubeba village's community. This research was conducted for one week on 22th-26th November 2021 using descriptive methods. The data was collected through open interview. The determination of respondent uses snowball sampling technique. There are 32 respondents. The interview reveals that people do hunting in group of 4-8 people when the new moon happens. This

group consists of adult men and teenage boys aged over 15 years. Adolescent boys were included with the purpose of inheriting knowledge. They hunt 3-4 times per month with the duration of 2-3 days in the forest. The hunters expand their hunting location over time. The respondents have two hunting methods, modern and traditional. Modern hunting is done using weapons. Meanwhile, hunting is traditionally done with the help of dogs, arrows, spears and traps. The hunting taboo relates to woman. Women are not allowed to do hunting and they cannot have a contact with all the hunting equipment and the catches before its cleaned. Hunting is carried out mainly to meet household needs. There are 16 species of wild animal that are hunted and 9 of them categorised as protected animals based on the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia. There is no conservation program applied by the hunter and the community to the wild animal. However, there is a shift in the menu. Several respondents stop hunting and start to raise domesticated animal to be consumed.

Ethnozoology, protected animal, Vogelcop

#### **DO-05**

##### **Mangrove biodiversity and its management strategies as sustainable ecotourism and contribute to achieve sustainable development goals**

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Mangrove forests, as one of the coastal ecosystems, are unique and vulnerable ecosystems. This ecosystem serves both ecological and economic purposes. The Sungai Apit District mangrove area has potential and has begun to be developed by the Siak government. The objective of this research was to formulate strategy of sustainable mangrove ecotourism by five research aspects : (1) identification of Mangrove species diversity; (2) identification of ecotourism supply; (3) identification of ecotourism demand, (4) development strategy of mangrove ecotourism, and (5) developing the potential for mangrove ecotourism to increase the SDGs value. This study was carried out from January to April 2020. Supply and demand potential was assessed by criteria analysis of ADO-ODTWA. IFAS/EFAS and SWOT analysis was used to formulate the strategy of mangrove ecotourism development which was based on valuation of ADO-ODTWA aspects. The SDGs indicator is used to determine the contribution of mangrove ecotourism to sustainable development goals. Based on study shows that there are 35 species of mangroves on the

coast of the Sungai Apit. Result showed that feasibility level of tourism attractions (204 point) and supporting elements (472 point) reached high level criteria. It indicated that the site was very potential to be developed as mangrove ecotourism area. Based on IFAS/EFAS and SWOT analysis and grand strategy selection matrix, position of strategy of mangrove ecotourism was on Quadrant I (Strength-Opportunity). The strategy that could be developed included (1) developing special interest mangrove ecotourism product; (2) increasing facilities; (3) improving the quality of human resources; (4) developing a network on the website and (5) increasing coordination with the Government. If this mangrove ecotourism strategy is developed, several sustainable development goals can be achieved, including: no poverty (goal 1); decent work and economic growth (goal 8); climate action (goal 13); life below water (goal 14); life on land (goal 15); and partnerships for achieve goals (goal 17).

Demand, development strategy, ecotourism, mangrove, SDGs, supply

## **DO-06**

### **Phenolic, mineral and proximate of kratom leaves at two location in Kapuas Hulu District, West Kalimantan, Indonesia**

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Kratom has become the main export product from Kapuas Hulu district, West Kalimantan Province, Indonesia. Kratom grows on the Kapuas river banks and it grows too at ex-Unlicensed Gold Mining (PETI). Until now there has been no research on the chemical compounds contained in the two fields because the data can reflect as medicinal ingredients, for example as a source of antioxidants. The research design used a mixed qualitative and quantitative method with samples in 2 sub-districts representing kratom productivity in Kapuas Hulu, Bunut Hilir Sub-District and, Boyan Tanjung Sub-District. Data analysis was carried out statistically with t-test ( $\alpha$  5%). The results showed that the riverside kratom leaves were rich in ash content with the highest macro minerals K and Na; M-rich micro-minerals while the highest total phenolics came from kratom leaves from PETI. Data shows at PETI, kratom leaves may be developed as a source of antioxidants.

Kratom, mineral, *Mytragyna speciosa*, phenolic, proximate

## **DO-07**

### **Ecosystem services research trends in Indonesia: A bibliometric analysis**

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Among the world's mega-biodiversity countries in the tropics, Indonesia has experienced the most severe deforestation in recent decades. It is alarming that the rate is potentially disrupting future provision of ecosystem services. In the other hand, there is a paucity of research on ecosystem services in Indonesia, and its current state is unknown. This study provided an overview of ecosystem services research trends in Indonesia from 1998 to 2020 using bibliometric and science mapping analysis of 298 published works from the Scopus database. Since 2013, publications on the topic have increased and grown exponentially, with environmental science dominating the subjects, followed by agriculture and biology, and the social sciences. Biodiversitas and Ecosystem Services are the most prolific journals for publishing results, while Science and Ecological Economics have the most citations. Being the most productive in publications, Indonesia and the United States are also engaged the most in research collaborations. Ecosystem services research in Indonesia is closely linked to biodiversity, deforestation, and oil palm. Furthermore, oil palm, sustainability, and land-use change are promising topics to address in the coming years. This study suggests that the dynamics of ecosystem services research in Indonesia call for further developments in improving the quality of impactful research through interdisciplinary approaches, international collaboration, and the engagement of diverse stakeholders and policy-makers related to the field, to increase the benefits of sustainable ecosystem services in the future.

Bibliometric, ecosystem services, Indonesia, research foci, science mapping

**DO-08****Mechanical properties improvement of antimicrobial bioplastics formed by impregnation of andaliman (*Zanthoxylum acanthopodium*) in starch matrix with bacterial cellulose addition**

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The use of conventional plastics has become one of the biggest environmental problems because of its difficult to decompose. Bioplastics are plastics that decompose easily in nature because they are sourced from natural. This study aims to produce antimicrobial bioplastics and obtain the best concentration of bacterial cellulose as reinforcement in the cassava starch matrix and the effect of andaliman extract as an antibacterial agent. The production of bioplastics was done by using the casting method. Based on the results of research, the addition of bacterial cellulose to bioplastics has been shown to affect the characterization results by FTIR, XRD, TGA and SEM. In FTIR analysis, there is a new absorption at wave number 1334 in the variation of the addition of 5-20% BC, which is the C-H bending of BC. In XRD analysis, it was found that the addition of BC shows a change in peak intensity, which means the addition of bacterial cellulose has an effect on the properties of bioplastic crystallinity. In the TGA analysis, with the variation of the mass of 0%, 5%, 10% 15% and 20% BC, there is a difference in the residual mass at a maximum temperature of 626°C, namely 0,38%, 15,1%, 5,4%, 7,16%, and 22,64%, respectively. Characterization using SEM showed a different surface morphology with the increasing number of BC scattered on the surface of the bioplastic. In the analysis of mechanical properties, there was an increase in tensile strength with the variation of BC 0%, 5% and 10% respectively 0.71 MPa, 1.75 MPa and 2.34 MPa. Meanwhile, the antibacterial test of bioplastics only showed a good antibacterial effect on *Bacillus cereus* bacteria with an inhibition zone of 10.8 mm.

Andaliman, antibacterial, bacterial cellulose, bioplastics, cassava starch

**DO-09****Chemicals exploration and drying effect on phytochemicals of bajaka wood (*Uncaria lanosa* var. *glabrata*) from Kapuas Hulu District, West Kalimantan, Indonesia****Sholahuddin<sup>1</sup>, Sulvi Purwayantie<sup>1</sup>, Lucky Hartanti<sup>1</sup>, Warsidah<sup>2</sup>, Zulfadhli<sup>1</sup>**

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Bajaka that call as akar kelait (*Uncaria lanosa*) from West Kalimantan has never been published because there is no information available, especially about nutrition and phytochemicals until now. The wild plant is used for traditional medicine by Dayaks. Scientific proved is needs to support commercial development of traditional medicine. While, mineral is the one of main standard as a global drug ingredients. The preparation process of powder is using drying because it is essential to obtain the higher alkaloid as one of modern ingredients drug. This research purposes was to determine of phytochemicals and nutrition that effected by drying methods. Research design was conducted by survey at Kapuas Hulu District with 3 grown located and drying processes using 3 methods. Data were analyzed by descriptive. The results showed that bajaka woods were contains alkaloids, terpene, saponine and steroid except the wood that grown in peat is not detected after drying. The woods were higher carbohydrate and fat, while the macro mineral higher K or Na and the micro higher of Fe. Drying methods was effected to alkaloids especially that produce by oven (40°C) and grown in peat soil. The trend showed that the lower of alkaloids was produced by sun drying that grown in hill. This information is essential for next to development for commercial plantings and drying processes for higher phytochemicals so that suitable for ingredient traditional medicine standard.

Akar kelait, alkaloid, bajaka, mineral, *Uncaria lanosa*

**DO-10****Review: Current checklist of local name and utilization information of Indonesian wild mushroom**

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Mushroom have been considered as important part of human life due to their various benefits and potentials. In Indonesia, many indigenous peoples are get used to forage and use wild mushroom as part of their daily lives. To date, there was no prior local name checklist of wild mushroom



and their uses in Indonesia. Thus, this review aims to provide the latest working on that information known so far in the country. A literature review was focusing on the available publication contained local name and use of wild mushroom in Indonesia. A total of 107 mushrooms are known to have 165 local names with 30 of them having more than 1 indigenous name. Some of them: *Coprinus* spp., *Polyporus* spp., *Schizophyllum commune*, *Scleroderma* spp., *Termitomyces* spp., and *Trametes* spp. are known to have 5 local names for each region and ethnicity that use them. A total of 50 species of mushrooms are used as food and traditional medicine. The information were derived from 8 provinces and 8 tribes, of which West Kalimantan Province and Javanese ethnicity contributing the highest number of it. The number of local name is expected to increase as more investigations are conducted in the near future.

Checklist, ethnomycology, Indonesia, local knowledge, macrofungi

## Bioscience

### EO-01

#### Development of rapid detection kit to detect seed health and endemicity mapping of Huanglongbing (HLB) disease in Koto Tinggi, West Sumatera, Indonesia

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Research entitled Development of Rapid Detection Kit to detect Seed Health and Endemicity Mapping of HLB Disease was carried out to address the problem of HLB caused by *Candidatus liberibacter asiaticus* (CLAs) that is severely threatening the Indonesian citrus industry particularly the small-scale citrus growers who contribute approximately 80% of the country's total citrus production. Three research activities were conducted, namely: 1) evaluation and validation of LAMP-based rapid detection kit of HLB prototype; 2) demonstration of application technique of rapid detection kit of HLB; and 3) endemicity mapping of HLB in citrus endemic area as a basis for generating community-based early warning/response systems in managing HLB outbreaks. Prototype of rapid detection kit resulted from this study provides a specific, sensitive and rapid diagnostic tool for the distinction of HLB, with the potential to be standardized as a detection method for CLAs and will be very useful for monitoring the disease incidence in the field, further suggesting the management strategies. The sensitivity of this LAMP assay is very similar to the PCR method. This LAMP assay is

simple, rapid, and can be performed with a water bath or heating block. It is ideal for resource-limited settings where HLB is endemic. Relative to conventional PCR, the LAMP assay reported here is easier to perform and more rapid, and the results are easier to evaluate. The demonstration results concluded that 1) HLB rapid detection kits can be applied by participants who previously did not have expertise in the molecular field with success rates above 95%; 2) rapid detection kit results of this evaluation have met the ASSURED criteria so that they can be applied in citrus development areas where detection facilities are not available, and 3) rapid detection kits as a result of this research can be developed as commercial products. The results of study 3 are interactive maps that describe the geographical boundaries of Koto Tinggi. Maps are processed through the Adobe Reader application in the .pdf format so that by activating/ deactivating the virtual layer allows citrus farmers, field officers and anyone who needs, can see various displays, including: geographical distribution of citrus plantations in the development area, incidence of HLB, prevalence of *D. citri* vector, seedling status and other factors that influence the incidence of HLB.

*Citrus*, endemicity mapping, Huanglongbing, LAMP, rapid detection

### EO-02

#### Enhancement of astaxanthin production from *Haematococcus pluvialis* under various growth media and times of UV radiations

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Astaxanthin (AX) is known as a very strong antioxidant and has been utilized in many kinds of products such as foods, pharmaceutical, cosmetics, aquaculture, etc. One of the natural resources of AX is *Haematococcus pluvialis* which has been investigated by some researchers in order to enhance the AX production. However, the production of AX from the microalga is still costly, hence this present research is proposing low-cost methods namely bean sprout media (BSM) as an alternative growth media and UV radiation. The variations of BSM concentrations (2, 4, and 6 %) and times of UV radiation (1.5 and 3 hrs) were treated to *H. pluvialis* in laboratory conditions. BSM 4 % treatment showed an optimum growth of the microalga at 427 x 10<sup>4</sup> cell/ml (day 8) which also exhibited macrozooid, palmella, and aplanosore phases. UV radiation for 3 hr revealed that the concentration of AX production was as much as 17,37±0,04 mg/l. The research results were potential to be developed further in order to discover better method for scaling up AX production.

Astaxanthin, bean sprout media, *Haematococcus pluvialis*, UV radiation

**EO-03****Tempe as functional food in the Covid-19 era: In probiotic perspective****Dewi Peti Virgianti, Rochmanah Suhartati**

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The COVID-19 pandemic is far from over, especially with the emergence of new virus variants. Efforts to develop vaccines and treatments have been made, but various prevention strategies must still be developed in order to combat this pandemic. Probiotics are cultures of one type or a mixture of live bacteria that help to maintain the balance of the gut microbiota, which is important for the host's health. Various studies have presented evidence that probiotics have the ability to boost human immunity. Tempe is a fermented Indonesian food that is high in probiotics. In this study, we will present the potential of probiotic bacteria in tempeh that have been shown to improve host health, particularly in terms of increasing immunity, preventing respiratory infections, and lowering risk factors for comorbidities. The data presented is expected to provide an overview of the potential consumption of tempeh as a functional food, particularly in this era of the COVID-19 pandemic, so that awareness of the benefits of this beneficial food grows.

Bacteria, fermentation, health, soybean, tempeh

**EO-04****Detection of the pork Cyt b gene in commercially processed meat products using Taqman qPCR methods for labels verification****Ernawati Puji Rahayu<sup>1,2</sup>, Abinawanto<sup>1</sup>**<sup>1</sup>Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Indonesia. Jl. Lingkar UI, Depok 16424, West Java, Indonesia<sup>2</sup>Indonesian Food and Drug Authority in Jakarta. Jl. Assyafiyah No. 133 Cilangkap, Jakarta 13870, Indonesia

Surveillance of adulteration of animal ingredients is a significant challenge for government agencies. This study aims to detect the pork Cyt b gene in various commercially processed meat products sold online in Jakarta using Taqman minor groove binder combined with a qPCR fast profile. A total of 15 commercial meat products consisting of 5 processed meat products (canned corned beef, beef jerky, beef shredded, meatballs and, smoked meat) were extracted, measured the concentration and the purity, tested for DNA integrity and amplified with Taqman qPCR. The result showed that all samples had sufficient DNA; the DNA purity was 1,71-1,91; all genomic DNA was fragmented; there was no amplification of the pork Cyt b gene. Commercially processed meat products are sold online in Jakarta comply with labels regulation by the Indonesian Food and Drug Authority and consistently maintain halalness.

Cyt b, labels verification, pork, processed meat products, Taqman qPCR

**EO-05****The *Thromboplerous hyphae* of ectomycorrhizal mushroom *Rhizopogon roseolus*, with and without the host tree****Ivan Permana Putra<sup>1,2</sup>, Tadanori Aimi<sup>1</sup>, Norihiro Shimomura<sup>1</sup>**<sup>1</sup>Faculty of Agriculture, Tottori University. Koyamacho Minami 4-101, Tottori 680-8553, Japan<sup>2</sup>Department of Biology, Faculty of Mathematics and Natural Sciences, Institut Pertanian Bogor. Jl. Agatis Kampus IPB Dramaga, Bogor 16680, Indonesia

*Thromboplerous hyphae* are modified hyphae commonly found in basidiocarp of many agarics, but with obscure development and function. In addition, the information of its formation in pure cultures is scarce. This study was aimed to characterize the cytological descriptions of *Thromboplerous hyphae* from pure cultures of *Rhizopogon roseolus*, with or without the host pine tree, *Pinus thunbergii*. *Thromboplerous hyphae* were formed on mycelium and mycelial cords of all the experimental settings. Generally, *Thromboplerous hyphae* were extremely melanized, smooth and cracked on the surface, swollen at both hyphal termini. *Thromboplerous hyphae* produced with the host were mainly straight in shape, in contrast to those formed without a host, which posed the additional twisted, semi-twisted, and trichome-like structures. Some *Thromboplerous hyphae* were displayed a huge diameter without the host. In addition, a few *Thromboplerous hyphae* produced without hosts showed notable septae and clamp connections. We also provide the first evidence of the initial development of *Thromboplerous hyphae*. This study contributes to improving the cytological understanding of *Thromboplerous hyphae* with or without a host tree. Further investigation on the specific function of *Thromboplerous hyphae* is needed to deepen the current knowledge of fungal cytology.

Cytology, host, pure cultures, *Rhizopogon roseolus*, *Thromboplerous hyphae***EO-06****Stock identification of kawakawa *Euthynnus affinis* from Malaysian Borneo using a morphometric analysis****Khaled Binashikhbubkr, Darlina Md. Naim**

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*Euthynnus affinis* (Cantor, 1849) (kawakawa), a small epipelagic tuna that migrates, is one of the most commercially important tunas in Indo-Pacific tropical and subtropical waters. Regrettably, the management and stock

structure of certain migratory species in the area are not well understood. The present investigation proposed to discriminate body shape differences between eight populations of *E. affinis*. A total of 188 individuals of *E. affinis* were collected from three central geographic regions; South China Sea, Sulu Sea, and Celebes Sea. Multivariate analyses, such as discriminant function analyses (DFA) and Principal component analyses (PCA) of 12 morphometric characters were carried out to discriminate eight populations of *E. affinis*. The findings divulged that the *E. affinis* populations of Malaysian Borneo (Sarawak and Sabah) were morphological homogenous. This is the first report on *E. affinis* Malaysian Borneo using a morphometric approach.

*Euthynnus affinis*, DFA, Kawakawa, morphometric, PCA

## EO-07

### Distribution of rhizopheric actinomycetes on karst ecosystem of Gorontalo, Indonesia

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Karst ecosystem is one type of extreme marginal soil with chemical, physical and biological fertility. Karst Land is characterized by high calcium (Ca) content, which can affect the availability of essential elements for plants. Actinomycetes are the original microbial of land and are distributed on various types of soil, including on Karst soil. Distribution, the abundance, and diversity of actinomycetes on plant rhizosphere are strongly influenced by soil physicochemical characters. The objective of this study was to obtain actinomycetes and to determine of abundance and distribution of actinomycetes on the rhizosphere of various types of plants. The soil sampling was conducted on plants rhizosphere on Bilato, Karang Putih, and Biluhu Karst Hill of Gorontalo based on the purposive sampling method. The physicochemical analysis was included soil acidity, temperature, and humidity. The results showed that the abundance of actinomycetes was various on six plant rhizospheres about 30x10<sup>1</sup> to 10x10<sup>3</sup> CFUMI-1. There were five actinomycetes isolates on the plant rhizosphere in Bilato and Biluhu Karst ecosystem with uneven distribution.

Actinomycetes, karst ecosystem

## EO-08

### The effect of vermicompost and biostarter to the growth and photosynthetic rate of *Echinacea purpurea*

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*Echinacea purpurea* or known as purple coneflower is a medical plant originated in North America and began to be cultivated in Indonesia. A proper method is needed for improving its growth and development to be adjusted and cultivated in a tropical area like Indonesia. Organic materials such as vermicompost and biostarter can be the way to increase plant growth and photosynthetic rate of *E. purpurea*. This study is aimed to know the effect of vermicompost and biostarter to the growth and photosynthetic rate of *E. purpurea*. This study used a Split-Plot Randomized Complete Block Design with two factors and three replications. The factors are vermicompost dosages with 4 levels 0, 40, 60, 80 g/plant and different types of biostarter from banana peel waste and EM4. Observed data included plant height and width, leaf numbers, leaf area, photosynthetic and transpiration rate, also stomata conductance. The results showed that treatment of 80 g/plant vermicompost and EM4 highest resulted in plant height (72,6 cm); leaf numbers (82); and stomata conductance (0,4574 mol m<sup>-2</sup>s<sup>-1</sup>). Leaf area (87,21 cm<sup>2</sup>) and photosynthetic rate (0,6839 μmol m<sup>-2</sup>s<sup>-1</sup>) showed the highest result with the treatment of 80 g/plant vermicompost and biostarter from banana peel waste. The treatment of 60 g/plant vermicompost showed the best result in plant width (50,25 cm) also transpiration rate (0,2390 mmol m<sup>-2</sup>s<sup>-1</sup>). This study concluded that there were an interaction between vermicompost and biostarter to the growth and photosynthetic rate of *E. purpurea*.

biostarter, *E. purpurea*, growth, photosynthetic rate, vermicompost

## EO-09

### Comparative leaf anatomy of two *Adiantum* species (Pteridaceae) with reference to their potential adaptation to drought

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*Adiantum caudatum* and *Adiantum latifolium* are two ornamental ferns which can be found grows in several wild area of Java. They have shares different habitat characteristics. *Adiantum caudatum* lives on riverbanks or limestone cliff edges with medium light, while *Adiantum latifolium* grows on urban or rain forest floors with moist soil and low to medium light. In understanding their potential adaptation to drought which is increasing due to global warming, we compared and analyzed the leaf anatomy of the two species. We also looked at their chlorophyll content as supporting data to determine the

relationship between environmental preferences and anatomical characteristics. The transverse section was obtained following the method using a hand microtome, while the paradermal section was obtained by following the leaf scrapping method. Chlorophyll content obtained by following the Arnon's method. The results show that there are differences in quantitative anatomical characters between both species. We also found characters that could potentially be useful in dealing with drought in both, such as the presence of silica bodies and sinuous anticlinal walls of epidermis. However, there are characters that make them also susceptible to drought, such as heterogeneous stomata types, large subsidiary cell number and high stomatal density. Compared to *A. latifolium*, it seems *A. caudatum* has some characters that more able to live in drier and more open places. This is evidenced by the anatomical characters and chlorophyll content, such as the presence of trichomes and silica bodies on leaf surface, thinner leaves but have thicker cuticles, narrower primary vascular bundles, lower total chlorophyll content, and higher a/b chlorophyll ratio.

*Adiantum*, drought, leaf anatomy, potential adaptation

## **EO-10**

### **Yield and yield component association and salinity tolerance of rice lines under mild stress condition**

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The research was aimed to study yield and yield component association and salinity tolerance of rice genotypes under mild stress. The activity was done in Soge, Kandanghaur Indramayu District, West Java Indonesia, in July-November 2020. The material consisted of 150 genotypes including 16 check varieties represented high yield popular rice variety and salinity tolerance rice varieties. The trial was arranged in an alpha lattice design with two replications with a 4 m<sup>2</sup> plot size. Twenty-one old seedling was manually transplanted with twenty-one old seedling in one hole and 30 x 30 cm planting space. The result showed that under mild stress condition, grain yield was positively associated with vigor, plant height, tiller number, spikelet fertility and negatively associated with unfilled grain number. These traits can be used as indirect selection criterion for high grain yield under mild stress condition. Grain yield did not associate with salinity tolerance at seedling stage. As many as nine rice lines showed higher grain yield significantly different with the best salinity tolerance check FL478. These lines will be further tested for their yield potential and stability in different rice growing area with a wider plot size.

Agronomic traits, mild saline stress, rice

## **EO-11**

### **Ethanol production from pineapple hump by simultaneous fermentation using three types of microorganisms and two-stage purification**

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Continuous energy consumption with technological developments and extensive use of fossil fuels causes many social, economic and environmental problems. So the search for renewable energy sources and the use of alternative fuels such as bioethanol appears. Pineapple is an alternative raw material in the manufacture of bioethanol because Indonesia is the 10 largest pineapple producing country in the world and leaves 0.62 million tons of pineapple waste a year. The purpose of this study was to determine the best yeast between *S. cerevisiae*, *D. hansenii* and *C. tropicalis* which could produce the highest concentration of ethanol using the enzymatic hydrolysis method and simultaneous fermentation and to determine the difference in the concentration of ethanol produced after going through one stage and two stages of purification. The research method used is a laboratory experiment. The research data were analyzed using the Preference Ranking Organization Methods for Enrichment Evaluation (PROMETHEE II) method. The production process uses the Saccharification and Simultaneous Fermentation (SSF) method. The purification process is carried out through a distillation process in two stages. The resulting data is the result of repetition 3 times. The use of *D. hansenii* yeast and one purification process resulted in the highest ethanol concentration of 4.32 g/L. Purification carried out twice actually reduces the concentration of ethanol present, so it cannot be used as an alternative in ethanol production.

Ethanol, pineapple, PROMETHEE, SSF

## **EO-12**

### ***Terminalia catappa* extract to increase survivality and growth of fish juvenile *Apteronootus albifrons***

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*Apteronootus albifrons* as introduction existence of ornamental fish in Indonesia has been quite a long time. Problems began to emerge, is the low survival rate which is possible the decline of water quality. The aim of this research is to understand the survival rate and the growth of black ghost fish's seed on the medium which is contained *Terminalia catappa* leaves, for this research the object used is from Bogor. The medium that has been used is the

aquarium in size 30 x 20x 21 cm with water volume 10 l/tank. The stocking densities are about 40 fishes with the size of  $2,89 \pm 0,2$  cm avaragely, with the medium which was added the extract *T. catappa* with the different quantity at once as the movement, which can be explained, first movement as a control, second movement with 1 g/L dose, third movement with 2 g/L dan fourth movement with 3 g/L have been repeated four times per each movements. The type of weft used have a form as *Tubifex* sp. which had been feeded to the object two times a day which in the morning and in the afternoon adlibitum. The parameter i focused on were the track and the growth (weight and lenght) as well as the quality of the water. The result shows that the best medium for growing the seed of the black ghost fish is with an addition 1 g/L of extract *T. catappa*. The highest survival rate was 31.25 percents bigger, the absolute lenght was 1.54 cm and the acceleration of the growth was 0,43 grams more weight.

*Apteronooutus albifrons*, dose, extract *Terminalia catappa*, growth and water quality, survival rate

### EO-13

#### Phenolic compound and antioxidant activity in ginger leave (*Zingiber officinale* Roscoe var Roscoe)

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Indonesia life expectancy is 73,34 (women) and 69,44 (man) in 2019. Ageing cause increase imbalance oxidant and antioxidant that induce degenerative disease. Vegetable and Fruit and other plant are known have a lot of chemical compound especially phenolic as antioxidant, that's why study of phenolic compound and antioxidant activity in plant is very important. Phenolic content and antioxidant activity of ginger (*Zingiber officinale* Roscoe) in rizhome were been more information, but less information in leaves. The aim of these research to determine antioxidant activity and phenolic content on leaves of ginger. These research was conducted with descriptive quantitative research using dried and fresh ginger in decoction extraction method. Determination of phenolic content was used Folin C method and antioxidant activity was used DPPH method and measure by using Spectrophotometer UV Vis. Base on mann Whitney u tes showed that phenolic content of dry leaves higher 24,30 mg GAE/g $\pm$ 0,26 than Rizhome 22,67 mg GAE/g  $\pm$ 0,26 but not significant at  $\alpha$  0,05 and antioxidant activity in dry rizhome 52,01 %  $\pm$  1,14 higher than in leaves 46,9 %  $\pm$  1,73 but in Fresh Ginger leaves have antioxidant activity higher than in rizhome but still  $\leq$ 50 %. Conclusion in these research rizhome has antioxidant activity higher than leave but total phenolic content not different.

Ageing, antioxidant activity, degenerative, phenolic

### EO-14

#### Effects of compost on microbial population, soil enzyme activity and vegetative growth of sweet corn on polybag

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Composting is a better solution in managing theorganic wastes such as leaf litter, spent mushroom substrate and biochar. An end products of composting is humic-enriched products and can be used as organic amendment. The use of bioactivator during composting process is relatively efficient to accelerate the enzymes activities and to support any process related to crop production. The effect of organic wastes composted with bioactivator treatment (CB) and without bioactivator (NB) was compared with compost CB + 50% syntheticfertilizer (CF), compost NB + 50% synthetic fertilizer (NF) and 100% synthetic fertilizer (SF) on vegetative growth, soil microbial population, soil enzyme activities of sweet corn. Microbial population and soil enzyme activities in the root areas of corn in CF treatments significantly increased compared to control (CT), NB, NF, and SF treatments at 0 and 6 weeks. The wet weight biomass of sweet corn in CF treatment was about 16-17 times higher than CT and SF treatment at 6 week. The findings of this research showed that the composting process of organic leaf litter, spent mushroom substrate, and biochar by adding enriched bioactivator combined synthetic fertilizer with balanced usage can improve crop production. A compost can reduce the use in large quantity of synthetic fertilizer in agriculture.

Decomposer, humic substance, soil conditioner

### EO-15

#### Maltotriose and maltopentose forming amylase : Isolation, identification and charace rization

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Oligosaccharide is an important group of carbohydrate macromolecul composed of 2 to 20 saccharide units. Oligosaccharide has many benefits in the field of food and health. Starch is one of the source origin material for oligosaccharide production by enzymatic process. Canna plant (*Canna edulis* Ker Gawl) contain high carbohydrates especially starch of about 93,3%. To obtain oligosaccharide from canna starch can be hidrolyzed using amylase enzymes which are produced by amyolytic bacteria isolated from rhizofer, canna plant tissue and litter. This study aimed to isolate amyolytic bacteria from rhizofer, canna plant tissue and litter, to characterize and identify

amylolytic bacteria and to identify oligosaccharide compounds from hydrolysis of canna starch. Seven isolates were successfully grown on Nutrient Agar (NA) medium with 1% soluble starch added. The isolate with the highest amylolytic index (IA) was D3 of 300 mm and T10 of 200 mm, but only one isolate had the potential to produce amylase enzyme extract, namely isolate T10. The highest amylase production of T10 isolate was at a temperature of 40°C, pH 7 and day 3. TLC analysis of the hydrolysis of canna starch showed the presence of oligosaccharide compounds, namely maltotriose and maltopentose. Thus, canna starch can be randomly converted into simple sugars and maltooligosaccharides applying by amylolytic enzymes from rhizosfer canna plant. Based on the 16S rRNA gene sequencing analysis, isolate T10 had the highest similarity with *Bacillus toyonensis* SPa09NA by 99.93%.

Amylolytic bacteria, Canna (*Canna edulis*), oligosaccharides, 16S rRNA gene

## **EO-16**

### **Bioassay antioxidant isolates *Lactobacillus plantarum*, *Monascus purpureus* and *Phaffia rhodozyma* and with DPPH method**

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The purpose of this study was to determine the ability to produce antioxidant compounds produced by isolates of *Lactobacillus plantarum*, *Monascus purpureus* and *Phaffia rhodozyma*. The method used is to test the activity of hydrolytic enzymes (protease, amylase, cellulase and lipase). The antioxidant test was carried out using the 1,1-diphenyl-2-picrylhydrazil (DPPH) method. The results showed that *M. purpureus* had a high clear zone coefficient on the amylase (2,666) and cellulase (1,750) enzymes, *L. plantarum* on the protease enzyme test (1,857) and *P. rhodozyma* on the lipase enzyme test (1,400). Antioxidant test using the DPPH method resulted in free radical inhibition of 1.12% in *M. purpureus* 1.09% in *L. plantarum* and 1.42% in *P. rhodozyma*. The conclusion was that each tested isolate had the ability to produce antioxidants, where the highest yield was obtained from the *L. plantarum* isolate.

Antioxidant, DPPH, *Monascus purpureus*, *Lactobacillus plantarum*, *Phaffia rhodozyma*

## **EO-17**

### **Characterization of women aquaponics farmer**

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Growing efficient food throughout aquaponics system technology is now conducted in limited land use especially in urban area of the cities. Aquaponics system produce plant and fish at once by combining aquaculture and hydroponic. Despite proliferation of this urban farming activities, there is limited skill and technology about it. This research aimed to determine the motivation, profile and characteristic and also performance as well of urban farmer in aquaponics system technology. Generally, there is a lack of skill about these are as conventional agriculture even though has good quality and healthier.

Aquaponics, characteristic, women farmer

## **EO-18**

### **Soilless culture in urban farming**

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Urban farming is proliferated across the world related to largen urban area and population in the city and people need food closer and healthier. Finite area forced urban dwellers to grow food on landless use or soilless culture to cultivate any agricultural commodities by citizen in urban area. Urban farmer is not a real farmer actually, urban farmer is someone who interest in growing plant or fish, even has limited skill in farming but their curiosity become the important things to make the progress of urban farming activities. Urban farming become more beneficial edible food that start from interesting in environment, green city, planting hobby but the soil and land is the limitation. Despite prohibited land scarcity, also by soil medium. Anyway, urban farming used soilless culture for rooting medium and nutrient. The soilless medium included less or minimum soil, hydroponics, aquaponics, aeroponic. Soilless culture now in advance set as vertical farming particularly in urban area that has finite land.

Finite land, medium, plant

**EO-19****Isolation and testing of pepper plant endophytic bacteria (*Piper nigrum*) as antagonists against pathogens *Ralstonia solanacearum*, *Aspergillus flavus* and *Rigidoporus microporus***

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The study of endophytic microbes continues to experience sustainability related to their ability to produce active compounds that are anti-bacterial and antifungal. This study aimed to isolate endophytic bacteria from fruit peels and leaves of Pepper (*Piper nigrum* L.) and to test its potential resistance to *Ralstonia solanacearum*, *Aspergillus flavus*, and *Rigidoporus microporus*. Isolation of endophytic bacteria was carried out by surface sterilization method with alcohol and sodium hypochlorite on tryptic soy agar (TSA) medium. There were 8 endophytic bacteria isolated from fruit peel and pepper leaves. The selection results showed that 8 isolates of endophytic bacteria only produced dispersion without any inhibition against *R. solanacearum*, *A. flavus*, and *R. microporus*. The absence of an inhibition zone indicates the possible absence of compounds that have antibacterial effects.

Endophytic bacteria, *Piper nigrum*, *Ralstonia solanacearum*, *Aspergillus flavus*, *Rigidoporus microporus*

**EO-20****Medicinal plants from North Kalimantan (Indonesia) against dental caries and periodontal disease**

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There are a lot of medicinal plants in North Kalimantan, and they are still used daily by the indigenous people. This encourages us to study and protect the sustainable use of medicinal plants from these communities. This wealth of local wisdom is then poured into research that aims to prove the efficacy of plants used by indigenous peoples. The aim of this study is to find an antimicrobial material from the 11 medicinal plants, we focused on the plant used for oral treatment by native people of North Kalimantan. We have selected 11 medicinal plants usually used daily

life by native people. We determine samples using antimicrobial assay and GTase method. We obtained the most effective sample is *Garcinia parvifolia* as antimicrobial activity against oral pathogens namely *Streptococcus sobrinus* and *Porphyromonas gingivalis* with the MIC value of 0.5 mg/ml inhibition on both of bacteria and MBC value of 0.5 mg/ml and 1 mg/ml, respectively. Methanol extract of *G. parvifolia* leaf showed antimicrobial activity in a MIC and MBC assay by activity-guide fractionation. Based on these results, we validated that the leaf extract has used by traditional tribe of North Kalimantan.

Antimicrobial, *Garcinia parvifolia*, North Kalimantan, *P. gingivalis*, *S. sobrinus*

**EO-21****Medicinal plants of the Dayak Tribe: Antioxidants and antibacterial properties**

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The use of traditional medicinal plants has been carried out by the Dayak Tribe for generations, including the akar kuning (*Arcangelisia flava* Merr), laos (*Alpinia galanga*), padaran (*Zingiber montanum*), and turmeric (*Curcuma longa*). This plant is known to have antibacterial, antioxidant, and anticancer activity. The purpose of this study was to determine the phytochemical content of these plants and their potential as antibacterial and antioxidant. Plants were extracted with hexane, ethyl acetate, and methanol as solvents. Antibacterial activity tests were carried out on the bacteria *Ralstonia solanacearum*, *Staphylococcus aureus*, *Streptococcus sobrinus*, *Salmonella typhi*, *Propionibacterium acne* using the agar well diffusion method with concentrations of 500, 1000, and 2000 ppm. Antioxidant activity was tested by DPPH free radical activity mechanism. The results showed that the extracts of Padaran rhizome and turmeric did not have antibacterial activity in the absence of an inhibition zone formed. In akar kuning, the best antibacterial activity was methanol extract (2000 ppm) against *S. aureus* bacteria with an inhibitory power of 34%. Then in Laos the best inhibition of bacterial activity was in the ethyl acetate extract against *R. solanacearum* which was 36% both at concentrations of 1000 ppm and 2000 ppm extract. From the test results for the 4 types of plants, the highest antioxidant activity was shown in the laos methanol extract

with antioxidant activity reaching 95.01% and this value was also higher than Vitamin C (94.51%). Then followed by ethyl acetate extract of Padaran rhizome with an inhibition of 89.65%. In the akar kuning and turmeric rhizome the highest value in the extract was with ethyl acetate solvent with inhibitory power of 84.41% and 82.79%, respectively.

Akar kuning, antibacterial, antioxidant, laos, Padaran, turmeric

## EO-22

### Introduction of Jarwo Super technology to increase rice plant productivity in Central Sulawesi, Indonesia

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Jarwo Super technology is one of the innovation components to increase rice productivity and farm efficiency. The adequately application of this technology is expected to support strategic government programs especially rice production enhancement program (UPSUS), in order to accelerate food self-sufficiency. The study aims to evaluate the farm's productivity and feasibility by introduction of Jajar Legowo super technology. The study used a factorial randomized block design with two factors. The first factor was the new high yield varieties, and the second factor was the planting system. The planting systems were differed to three tools namely: Jajar Legowo system using indo Jarwo planting tools; Jajar Legowo system using direct plant seeds (Atabela); Scattered plant system (farmer's technology). BC ratio was used to determine the economic feasibility while the effect of technology introduction was analyzed using MBCR. The results showed that rice productivity significantly increased the yields 2-3 ton per hectare, compared to the existing condition. The introduction of a direct seed planting system in jarwo super technology reduced labor cost therefore it is more efficient. The economic feasibility of technology introduction was shown by BC ratio of 4.23 and MBCR of 2.21. Based on those indicators jarwo super technology is recommended to be developed.

Innovation, Jarwo Super technology, planting system, rice plant

## EO-23

### Antagonistic activity of endophytic fungus *Trichoderma asperellum* against *Fusarium acutatum*

## Trizelia, Haliatur Rahma, Martinius

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Twisted disease caused by *Fusarium acutatum* is one of the main diseases of shallot plant that caused significant yield loss. This pathogenic fungus can be controlled biologically using the fungus *Trichoderma asperellum*. The purpose of this study was to determine the antagonistic activity of four *T. asperellum* isolates against *F. acutatum*. The design of this experiment was using a Complete Randomized Design (CRD) with 5 treatments and 4 replications. The treatments consist of 4 isolates of endophytic *T. asperellum* (A116, S2D1.2, SD3.2.4, SD3.2.7), and control. Testing the antagonistic ability of endophytic *T. asperellum* isolates against the fungus *F. acutatum* using dual culture method and volatile method. Data were analyzed by analysis of variance at the level of 5% and followed by the LSD advanced test at the level of 5%. In the dual culture method, all endophytic *T. asperellum* isolates were able to inhibit the growth of *F. acutatum* fungi with the percentage of inhibition 32.25-40.38 % at the age of 7 dai. All isolates of *T. asperellum* endophytic were able to inhibit the colony growth of *F. acutatum* up to 22.64%. Among the four isolates tested, *T. asperellum* endophytic isolate S2D1.2 was the best isolate that be able to suppress the growth of *F. acutatum* fungus.

Antagonist, dual culture, pathogen, shallot, volatiles

## EO-24

### Responses of solo garlic crops grown at low elevation of tropical areas to organic matter and paclobutrazol

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Solo garlic has been known for its medicinal benefit because of which it is considerably expensive. Nonetheless, no Indonesian farmer produces solo garlic intentionally since no information on how to grow solo garlic in Indonesia is available. Growers, usually harvest 5-10 kg of solo garlic from 1 hectare of garlic crop they grow. A greenhouse experiment was conducted from November 2018 to January 2019 at the Department of Agronomy, Faculty of Agriculture, Bengkulu University, about 10 m above sea level to study the effects of paclobutrazol and organic matter on the growth and yield of solo garlic crop grown at low elevation of Bengkulu. The experiment used completely randomized design arranged in factorial (2 factors; 5 replications). The first factor tested was organic matter levels (0, 2.5, 5.0, 7.5%) and the second factors was paclobutrazol concentrations (0, 500, 1000, 1500 ppm). Solo garlic seeds were planted in the polybag filled with 5



kg of media, a mixed of top soil and organic matter. The crops were sprayed with paclobutrazol at 21, 35, and 49 days after planting. The results showed organic matter did not significantly affected crop growth and yield. In contrast, paclobutrazol significantly affected crop growth and yield, with the best yield was found at 1500 ppm paclobutrazol. Furthermore, the best interaction between organic matter and paclobutrazol was found in 7.5% OM + 500 ppm PBZ for bulb diameter and in 2.5% OM + 1500 ppm PBZ for bulb fresh weight.

Clove, medicine, organic matter, paclobutrazol, solo garlic

## EO-25

### Different effect of biochar and liquid organic fertilizer (LOF) application on bulk density of spodosols and ultisols growing media

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Ultisols and Spodosols are two very different soil orders in respect to soil texture. Ultisols are advance developed soils dominated by clay particles in one hand. On the other hand, Spodosols are soils dominated by sand particles. Excessive soil density is one of the important properties that may limit the fertility and productivity of the degraded soils of these orders. The incorporation of organic matter is therefore required to improve this soil property. The purpose of this study was to determine the effect of the application of a combination of biochar and liquid organic fertilizer (LOF) on the bulk density (BD) of Ultisols and Spodosols growing media in polybags. The study was conducted following a completely randomized factorial design procedure with the application of biochar and the duration of immersion of biochar with LOF as research factors. Biochar application consists of 6 concentration levels: 0%, 2%, 5%, 10%, 25% and 100% while the duration of immersion of biochar with POC consists of 4 levels: 0, 1, 12 and 24 hours. After an incubation period of 3 weeks, sampling for BD test was carried out in 3 (three) different times: morning, afternoon and evening one hour after watering. In general, BD decreased with increasing concentration of biochar in the growing media. However, BD of both soils gave different response to biochar application. In Spodosols growing media, the application of 5% biochar gave a significant difference in soil BD as compared to control, while in Ultisols growing media a significant difference was only found in the application of 100% biochar. The immersion time treatment did not give a significant effect on BD on both growing media. Likewise,

there was no significant difference in bulk density values at all sampling times which represented differences in the humidity of the growing media.

Biochar, bulk density, liquid organic fertilizer (LOF), spodosols, ultisols

## EO-26

### Ethnobotanical study of the medicinal plant by local communities in karst area, Pacitan, East Java, Indonesia

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Local people's trust in traditional medicine methods is still high, especially in rural areas. Most of the villagers in Tulakan subdistrict, Pacitan Regency grow their medicinal plants in their yards. However, local people's knowledge of various types of medicinal plants is only conveyed orally from parents to children and community practice habits, so that information about the use of medicinal plants may begin to degrade from time to time. This study aimed to investigate the knowledge of local communities regarding the use of medicinal plants and the plant diversity, especially in the village of karst areas. The research was conducted in Bungur Village and Tulakan Village, Tulakan subdistrict, Pacitan Regency, East Java, Indonesia. Data collection was carried out using the snowball technique through open interviews and field surveys. A total of 40 respondents with 7 people of young age range 15-40 years and 33 people of old age range 41-75 years. Respondents with the most educational backgrounds are high school graduates with married marital status. A total of 52 species were found, from 49 genera and 33 families, with 52 diseases being treated. Fever, cough, external wounds are the most commonly treated diseases. The most widely used medicinal plant is *Zingiber officinale* to warm the body, fever, increase immunity. During the COVID-19 pandemic, the villagers orally consumed ginger for post-COVID positive recovery and maintained health. The most used plant parts are leaves and rhizomes by boiling, pounding, and consuming orally. Based on the results of the research, it is known that the knowledge of the local communities and the use of medicinal plants is still quite good from the older and younger people with various types of plants.

Diversity, karst area, local knowledge, medical plant, Pacitan

**EO-27****Ethnobotanical study of the non-medicinal plant by village communities in karst area, Pacitan, East Java, Indonesia**

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The local community of Pacitan Regency, especially in the karst area in several villages of Tulakan District, has yard and farm usually planted with many types of plants that have various benefits. These plants are used as edible plant, animal feed, spices, biopesticides, and plant growth hormones. However, the knowledge of the local community of Tulakan subdistrict regarding the various benefits of plants is only known from generation to generation, conveyed orally and daily practice habits, so that a study is needed to document this information. This study aims to reveal the knowledge of local communities and the diversity of non-medicinal plant species to meet communities' daily lives. The location of the research was carried out in 2 villages located in Tulakan subdistrict, Pacitan Regency, East Java, Indonesia, namely Bungur Village and Tulakan Village. Data collection was carried out through field surveys and direct interviews using the snowball sampling technique. A total of 40 respondents were interviewed with details 14 male and 26 female. Respondents with the majority of high school educational backgrounds have around 46-55 years. Inventory of non-medicinal plants amounted to 65 species of angiosperm plants from 44 families. The plants used consisted of 42 species for edible, 21 species for animal feed, 6 species for spices, 1 species used for biopesticide, and 1 species used for growth hormone. Based on the study results, it is known that local people use plants as edible with more diverse plant species compared to other uses.

Edible plants, karst area, fooder plant, local knowledge,  
Pacitan

**EO-28****The effect of gamma irradiation on seedling emergence in Indonesian accessions of *Echinacea purpurea***

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*Echinacea purpurea* is one of the perennial herbaceous species of the Genus *Echinacea* (Asteraceae) native to North America with broad pharmacological benefits. Indonesia is one of the countries that introduced *E. purpurea* as a medicinal plant and used it as an immunostimulator. However, research for the development of *E. purpurea* in Indonesia still needs to be explored to obtain the adaptive *E. purpurea* plants with optimal productivity in quantity and quality. This study aimed to determine the effect of various doses of gamma irradiation on the seedling emergence of *E. purpurea* accessions. The study was conducted using a completely randomized design for two accessions of *E. purpurea* with the dose of gamma irradiation consisting of control, 15 Gy, 25 Gy, 40 Gy, 60 Gy. In *E. purpurea* accession 3, showed that the gamma irradiation dose of 25 Gy was the most optimal dose for germination, while in accession 4, increasing the gamma irradiation dose gave a positive response to germination. Regression analysis showed that the highest germination of *E. purpurea* accession 3 was at a dose of 25 Gy gamma irradiation, and the gamma irradiation dose also affected germination by 54.3% with a positive direction. The highest germination of *E. purpurea* accession 4 was found at a dose of 60 Gy of gamma irradiation, and the dose of gamma irradiation could affect germination in accession 4 of 96.8% with a positive direction. In conclusion, various doses of gamma-ray irradiation had different effects on two Indonesian accessions of *E. purpurea*.

*Echinacea purpurea*, germination, irradiation, regression,  
gamma