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ABSTRACT

INTERNATIONAL CONFERENCE ON BIODIVERSITY

SOCIETY FOR INDONESIAN BIODIVERSITY

Mataram, 14-15 December 2019

Mangrove of Wailaki Beach, Sumba, Indonesia; photo by Antanasc

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ABSTRACT

INTERNATIONAL CONFERENCE ON BIODIVERSITY

SOCIETY FOR INDONESIAN BIODIVERSITY

Mataram, 14-15 December 2019

THEME:

The biological diversity and sustainable tourism development

SECRETARIAT ADDRESS

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TIME SCHEDULE

International Conference on Biodiversity

Society for Indonesian Biodiversity (SIB)

Mataram, Indonesia, 14-15 December 2019

TIME	ACTIVITIES	PERSON IN CHARGE	SITE
December 14, 2019			
07.30-08.30	Registration	Committee	Lobby
08.30-09.45	Opening ceremony - Indonesian National Anthem - Message from the Chairman of the SIB - Message from the Governor of NTB - Message from Rector of UNRAM & Opening - Gendang Beleq - Signing of MoU	Committee	R1
09.45-10.00	Photo session and coffee break	Committee	R1, Lobby
10.00-12.00	Panel **Dr. TGB. Muhammad Zainul Majdi, Lc., M.A.** **Prof. Dr. Theodore A. Evans** **Prof. Dr. Zakaria Hussin**	Moderator	R1
12.00-13.00	Rest, prayer, lunch & Poster session	Committee	Lobby
13.00-14.00	Parallel presentation I		
	Group 1: **AO-01 to AO-06**	Moderator	R1
	Group 2: **AO-07 to AO-12**	Moderator	R2
	Group 3: **AO-13 to BO-05**	Moderator	R3
	Group 4: **BO-06 to BO-11**	Moderator	R4
14.00-15.00	Parallel presentation II		
	Group 5: **BO-12 to BO-17**	Moderator	R1
	Group 6: **BO-18 to BO-23**	Moderator	R2
	Group 7: **BO-24 to BO-29**	Moderator	R3
	Group 8: **BO-30 to CO-04**	Moderator	R4
15.00-15.15	Coffee break, prayer	Committee	Lobby
15.15-16.15	Parallel presentation III		
	Group 9: **CO-05 to DO-02**	Moderator	R1
	Group 10: **DO-03 to EO-01**	Moderator	R2
	Group 11: **EO-02 to EO-08**	Moderator	R3
	Group 12: **EO-09 to EO-15**	Moderator	R4
16.15-16.30	Announcement of the Best Presenters Closing ceremony & other explanation	Board of Assessors Chairman of the Committee	R1

December 15, 2019			
08.30- 17.30	Field trip to Mataram City and the surrounding areas, i.e. - Beaches of Kuta-Mandalika-Tanjung Ann; - TWA Tunak-Sade Traditional Kampong; - Sasaku Souvenir Store - [Can change; depending on the conditions.]	Committee	Lobby
17.30	The end		

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Society for Indonesian Biodiversity (SIB)

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Diversity of Species

Diversity of Ecosystem

Ethnobiology and Socioeconomics

Bioscience

Note: A. Genetic Diversity, B. Diversity of Species, C. Diversity of Ecosystem, D. Ethnobiology and Socioeconomics, E. Bioscience (Life Science and Technology); O. Oral, P. Poster; AA. Keynote speech

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ABSTRACT

International Conference on Biodiversity

Society for Indonesian Biodiversity (SIB)

Mataram, Indonesia, 14-15 December 2019

Genetic diversity

AO-01

Expression of Mx gene exon-13 SNPs in Kamper chicken crossbreeds of Female Lohmann Brown-Classic and Male Pelung

Desiana Afifah, Indra Lesmana, Soenarwan Hery Poerwanto, Tri Joko, I Wayan Swarautama Mahardhika♥, Budi Setiadi Daryono

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Since 2008, Gama Ayam Research Team has conducted selective breeding of chickens with aims to produce a new native chicken breed with fast-growing quality, higher egg productivity, and disease resistance. Marker Assisted Selection (MAS) in selective breeding provides a faster more accurate and reliable selection of chickens. Diseases resistance gene in chicken can be the result of Mx gene expression. The aim of this research was to investigate the expression of Mx gene exon-13 SNPs in the population of Lohmann Brown-Classic, Pelung, and Kamper. The G1892A mutation in exon-13 of Mx gene resulting in a change of the amino acid 631 of Mx protein. The substitution of serine to asparagine indicates the ability of chickens to have immunity against viral diseases including avian influenza. Asparagine (A allele) at position 631 is specific to Mx+ (resistant), whereas serine (G allele) is specific to Mx-(susceptible). DNA amplification were using (5'-GCACTGTCACCTCTTAATAGA-3') forward primer and (5'-GTATTGGTAGGCTTTGTTGA-3') reverse primer. DNA was sequenced with sequencing gene promoter cFSHR. Mx gene sequence alignment obtained four SNPs. Four SNPs consisted of four substitutions (A20734T, C20737T, A20766G, and A20893G) with one haplotype. Mx Gene exon-13 SNPs were detected in Pelung and Kamper. This result concludes that Kamper chicken inherited the disease resistance gene of Pelung and therefore can be a strong candidate of parental generation in further selective breeding tree.

Avian influenza, kamper, Mx gene, resistance, SNPs

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

Molecular phylogenetic of Palm family based on cpDNA *matK* gene as DNA barcoding

Barahima Abbas[1,♥], Ihwan Tjolli[1], Munarti[2]

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Palm family has large species and broad disperse in tropical and subtropical countries as well as generally used as ornamental plant and others for foods. The Palmae family that resulting large amount of carbohydrates in the trunk is sago palm (*Metroxylon sagu* Rottb). The objectives of this study are revealed sequence chloroplast DNA (cpDNA) associated with *matK* genes in sago palm and revealed molecular phylogenetic genetic of Palm. Plant materials used in the studies were derived from Sago Research Center (SRC) and others. Palm sequences were retrieved from the GenBank, NCBI accessions. DNA extraction has adopted the procedure of Plant Genomic DNA Mini Kit. Polymerase chain reaction (PCR) was performed using matK primer sets. DNA PCR product was sequenced by 1st Base Asia, Singapore. Sequences of *matK* gene that were observed in the chloroplast genome of sago palm were registered into the GenBank NCBI as DNA barcoding. Sequence cpDNA associated with matK genes in the genome of sago palm were shown differences among

individual samples and separated into two groups. Molecular phylogenetic of sago palm and others Palmae based on *matK* gene showed sago palm incorporated into two clades and others Palmae separated into several clades. *Metroxylon sagu* and *Metroxylon warburgii* were described as close related comparing with other Palmae.

Chloroplast DNA, *matK*, molecular phylogenetic, palm, sago palm

AO-03

Resistance of local and introduced wheat varieties grown at medium altitude of East Lombok, Indonesia to *Fusarium* head blight

M. Taufik Fauzi♥, Khairul Ikhram, Mery Windarningsih

Faculty of Agriculture, Universitas Mataram. Jl. Majapahit No. 62, Mataram 83115, West Nusa Tenggara, Indonesia

The research aimed to determine the resistance of some local and introduced wheat varieties grown at medium altitude to *Fusarium* head blight had been conducted from June to October 2018 in Perian Village (8°34'31" S, 116°23'35" E with the altitude of 490 m asl. of Montong Gading Sub-district, East Lombok, Indonesia. The research applied a Randomized Completely Block Design (RCBD) with 12 wheat varieties, namely: Nias, Dewata (local wheat varieties), Ax, Gladius, Correll, Cobra, Espada, Scout, Mace, Sunstate, Janz, and Westonia (introduced wheat varieties). The incidence of *Fusarium* head blight disease was observed weekly in 36 field plots with a size of 1x3 m2 each. The weight of 1000 grain was also measured after harvest. The results showed that there were differences in the average percentage of *Fusarium* head blight incidence in each treatment. The highest disease incidence (52.66%) found in Ax variety with the resistance category of very susceptible to *Fusarium* head blight, while the lowest disease incidence (11.94%) is found in Nias varieties with the category of resistance. The highest weight of 1000 grains (37.70 g) is found in the Espada variety which is moderately resistant to the disease, while the lowest weight of 1000 grains (23.02 g) is found in the Cobra variety which is resistant to the disease.

Fusarium head blight, wheat varieties

AO-04

Microsatellite primer design of *Falcataria moluccana* for improving polymorphism on PCR analysis: Preliminary study

Siti Halimah Larekeng[1,♥], M.A. Arsyad[2], Y.F. Cahyaningsih[2], W. Isnaini[2], M. Restu[3]

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[3]Indonesian Tropical Fruit Research Institute. Jl. Raya Solok-Aripan Km. 8, PO. Box 5 Solok, West Sumatra, Indonesia

Development of molecular markers benefits tree breeding program. The study aimed to design Simple Sequence Repeat (SSR) primers of *Falcataria moluccana* L and validate the designed primers. The research consisted of designing primer using Primer3plus, DNA isolation, evaluating DNA quality and quantity and amplifying DNA using the designed primers. SSR primers *F. moluccana* that successfully designed were F1R1 (466 bp) forward (AGT-TAATCGGATC-AGTTGGA) reverse (T-GAAAAGTAAG-TGGAA-GGGAA), F2R2 (506 bp) forward (CTGCA-TGGTTGTCTT-GTGTA) reverse (TAAGCCCAG-AATATAATTC-CC), F3R3 (617 bp) forward (CATGGGACTT-ACAGCCTTAG) reverse (ACC-TCTGATTGCT-GAACACT), and F4R4 (836 bp) forward (ACAAAGAT-GGAGAGTAA-AG) reverse (TAATTTGTA-TGCAGCGATT-G). The SSR designed primer that could amplify *F. moluccana* DNA were F1R1, F2R2, and F3R3. Moreover, *Duabanga moluccana* and *Bambusa maculata* were also successfully amplified by F1R1, F2R2, and F4R4. Overall, these evaluated primers can be used in further analysis of genetic diversity of *F. moluccana, D. moluccana* and *B. maculata*.

Falcataria moluccana, microsatellite, PCR, polymorphism

AO-05

Seeds proximate characteristic of North Lombok *Moringa oleifera* accessions

Bambang Budi Santoso♥, Jayaputra

Research Group of Dry Land Agriculture Development, Faculty of Agriculture, Universitas Mataram. Jl. Majapahit No. 62, Mataram 83115, West Nusa Tenggara, Indonesia

This study describes variation in seed proximate characteristic of North Lombok *Moringa oleifera* Lam. accessions. Seed exploration was conducted in several areas where large population of this species grown as fences and also home-yard standing trees were found. Seed proximate component was analysis using AOAC 900.02A, AOAC 945.16, and AOAC 978.04 methods. The result indicated that considerable genetic and environmental variability might influence the variability in seed proximate component of the accession of North Lombok Moringa. Accession of B10, B7, G7, G9, and G3 were found as higher seed protein content, e.g. 32.4±0.2%; 31.9±0.3%; 31.3±0.3%; 30.8±0.1%; 30.6±0.3% respectively, and also their seed oil content, e.g. 31.8±0.5%; 31.5±0.4%; 31.5±0.2%; 30.9±0.4%; and 30.1±0.6% respectively. While accessions of P5, G5, and B6 were found as higher carbohydrate content, e.g. 27.9±0.4%, 26.3±0.6%, and 25.8±0.5% respectively, compared to other accessions.

Carbohydrate, mineral, oil, protein, vegetable

AO-06

Multi-stakeholder partnership to protect marine biodiversity in the Marine Protected Area of Gili Indah, West Nusa Tenggara, Indonesia

Lalu Arifin A. Bakti♥, Baiq Farista, Delphine Robbe, Arben Virgota

Department of Biology
Faculty of MIPA, University of Mataram, NTB, Indonesia

This paper focuses on collaboration or multi-stakeholder partnership and its potentials for protecting marine biodiversity in tourism-dependent-small islands. The growth in tourism worldwide has placed tremendous pressure on the Marine Protected Areas of Gili Indah (Taman Wisata Perairan (TWP) Gili Meno, Gili Ayer, and Gili Trawangan), West Nusa Tenggara, Indonesia systems (both human and environmental) that must be managed to maintain their natural beauty and value. The collaborative initiative "Gili Eco Trust" involving the local, foreigner's businesses, universities, NGOs, and local government, was established in 2001 to protect their marine ecosystem from destructive fishing such as dynamite or cyanide fishing methods, thus saving marine biodiversity of the islands. In response to the monetary crisis, the national reform in 1998, the global warming, and the unaccountability of the local government to enforce formal rules in marine resources, the collaborative work has initiated several strategies to meet the challenges, e.g., revitalization of the local institution called awig-awig to regulate coral reef activities, enforcement of the coral reef regulations, and restoration of the degraded coral reef ecosystem. This paper briefly explains how collaborative works respond to socio-ecological perturbation in tourism-dependent small islands using resilience thinking approach in order to save their marine biodiversity.

Biorock®, collaboration, ecotourism, marine biodiversity, multi-stakeholder partnership, small islands, sustainable tourism, panarchy

AO-07

Transformation, expression and purification of gen betaglucosidase from *Thermotoga neapolitana* to heterologous system *Pichia pastoris*

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Betaglucosidase is one of the enzymes of the cellulase enzyme which works synergistically with exoglucanase and endoglucanase. The abundance of betaglucosidase in a cellulolytic microorganism is less than endoglucanase and exoglucanase. Betaglucosidase deficiency can inhibit the hydrolysis process. Development of betaglucosidase from certain organisms can overcome problems during hydrolysis. The Bgl1A was derived from *Thermotoga neapolitana* and synthetically prepared with optimized codon to improve the best expression in *Pichia pastoris*. The gen was placed under the regulation of the GAP promoter. The beta-glucosidase gene was successfully transformed into *Escherichia coli*. Isolation, linearization and purification plasmid from the transformant was successful. Plasmid from the transformant was successfully isolated, linearised, and purified which had band around 4762 bp. The betaglucosidase gene from *Thermotoga neapolitana* was successfully transformed. The transformed *P. pastoris* clone was successfully selected on zeocin media with concentrations from 100 until 1000 µg/mL. PCR analysis results showed that there were 2 positive clones containing 500 bp. Recombinant protein expression and purification were analyzed by SDS-PAGE, and western blot. The molecular weight of the protein is estimated to be around 53 kDa. The beta-glucosidase gene has been successfully expressed in *P. pastoris* and the recombinant protein has been successfully purified.

Beta-glucosidase, expression, *Pichia pastoris*, purification, *Thermotoga neapolitana*.

AO-08

Seed morphology and biochemistry of *Elaeis oleifera*, *Elaeis guineensis*, interspecific hybrids (*Elaeis oleifera* x *Elaeis guineensis*) and Backcross 1 of oil palm

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There are two types of oil palm species, namely *Elaeis oleifera* (Kunth) Cortés and *Elaeis guineensis* Jacq. Both species have different superior characteristics. Crossing the species along with backcrossing is designed to improve the plant characteristics and create combined characteristics from the parents. The results of previous studies are still limited to oil quality, fruit bunches, and vegetative characters. Specific characteristics observations on seed conditions and food reserves have not been reported. This study used the seeds of *E. oleifera*, *E. guineensis*, interspecific hybrids, and backcross 1 with five replications, each consisting of ten seeds. The results showed that there were significant differences observed in seed weight and seed diameter parameters in all types of oil palm. Interspecific hybrids and backcross 1 showed mean values between *E. guineensis* and *E. oleifera*. *E. guineensis* produced the highest seed weight, reaching 27.16 grams, and *E. oleifera* produced the lowest, which was 12.03 g. Meanwhile, the interspecific hybrids and backcross 1

produced the seed weight of 18.19 g and 19.33 g, respectively. The same results were also observed in the protein and oil content of the seeds. The interspecific hybrids had the highest fat content (23.60%), and the backcross 1 had the highest carbohydrate content (16.03%). It can be concluded that the values of seed weight, protein, and oil content in interspecific hybrids and backcross 1 are the averages of both parents and additives. However, only fat content in endosperm seeds resulted in a higher percentage compared to the parents.

Backcross-1, *Elaeis guineensis*, *Elaeis oleifera*, interspecific hybrids, oil palm seeds

AO-09

Morphometric diversity and genetic relationship of Thai game fowl chicken offspring (*Gallus gallus domesticus*, Linnaeus 1758) in East Java, Indonesia

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Chickens are classified in the *Gallus gallus* species, which is also one of the genetic resources in Indonesia. There are an estimated 31 strains of local chicken in Indonesia with high morphological diversity. The one of contributor diversity on local chicken where has been known as Bangkok chicken (Thai gamefowl). This chicken is suspected imported from the Thailand region. This research was conducted in East Java Province, with sample areas covering Banyuwangi, Pasuruan, and Madiun Regencies. The material used in this study is a local chicken Bangkok chicken breed (Thai game fowl chicken) totaling 450 tails. The observed variables consisted of qualitative and quantitative characteristics in female production and adult male. The highest frequency of the comb form was Walnut (36.9%), followed by Singles (32.7%), Pea (18.7%), and Rose (11.8%). While, the highest frequency of shanks were black (2.9%), black and white (1.6%), yellow (42.2%), black and yellow (45%), yellow and white (4.2 %) and white (3.5%). The closest genetic distance was Pasuruan with Banyuwangi (96.044). Its presumably because the distance between Pasuruan and Banyuwangi is closer than Madiun with Banyuwangi, while Madiun with Pasuruan has the farthest genetic distance (682.028).

Gallus gallus, genetic, morphometric, Thai game fowl, walnut comb

AO-10

Morphological characteristic and distribution of mites in strawberry plant (*Fragaria vesca* L.) in high land Sembalun, Lombok Island, Indonesia

M. Sarjan♥, Handri

Faculty of Agriculture, Universitas Mataram. Jl. Majapahit No. 62, Mataram 83115, West Nusa Tenggara, Indonesia

This study aims to determine the morphological characteristic and distribution of pest mite species on strawberry (*Fragaria vesca* L.) in the Sembalun area, Lombok Island, Indonesia. This research has been carried out from November to February 2018 in two central strawberry production villages, namely Sembalun Bumbung and Sembalun Lawang, Sembalun Subdistrict, East Lombok District, West Nusa Tenggara Province, Indonesia. The method used in this research is descriptive method with survey techniques and data collection in the field. Two species of pest mites were found, namely *Brevipalpus phoenicis* Geijskes and *Tetranychus kanzawai* Kishida with an average population of 0.9±2.9 mites/plants. The dominance index and the highest abundance are T. kanzawai valued at 0.875 and 93.55%. Pest mite population distribution is quite even, where both mite species are found at each sampling location.

Brevipalpus phoenicis, strawberry, *Tetranychus kanzawai*

AO-11

Performance diversity of Pitalah and Sikumbang Jonti ducks in the early growth with intensively reared

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The aim of this study was to determine the performance variety of Pitalah and Sikumbang Jonti ducks in the early growth with intensively reared. This study used 60 heads of Pitalah and 60 heads of Sikumbang Jonti ducks, 11 days old, were kept in a cage of 10 units. The method of this study used the observation method with direct observation of the parameters. The parameters observed were feed consumption, protein intake, body weight gain, feed conversion, and growth rate. The data analysis used was means, standard deviation, and coefficient of diversity. To compare the difference in performance variety used, T-test analysis. In the research, the feed used was commercial ration CP 511. The result of the research showed that the range of diversity were 22-66% of body weight gain and 11-67% of growth rates. The highest diversity of body weight gain in Pitalah ducks was found in the 6th week at 66.93% and 7th week at 60.86% in the Sikumbang Jonti ducks. The highest diversity of growth rates in Pitalah ducks was found in the 6th week at 67.83% and 7th week at 62.95% in the Sikumbang Jonti ducks. The result of performances means in the research showed that feed consumption was 5316.7±322.622 g/head and 5322.3±147.52 g/head, protein intake was 1116.507±67.75 g/head, and 1117.683±30.979 g/head, body weight gain was 1247,466±79,54 g/head and 1233,4±74,46 g/head, feed conversion was 4.267±0.185 and 4.324±0.19, and growth

rates per week was 0.260±0.019 and 0.261±0.016. The result of the T-test analysis showed that not significantly different (P > 0.05) between Pitalah and Sikumbang Jonti ducks

Diversity, performance, Pitalah duck, Sikumbang Jonti duck

AO-12

Character morphology and relationship of local rice in Lombok Island, West Nusa Tenggara, Indonesia

Fitrahtunnisa♥, Eka Widiastuti, Baiq Nurul Hidayah

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Local rice is potential germplasm as a source of genes that control important traits in rice plants. The study was conducted to determine the morphological character and determine the relationship between local rice in Lombok. The method used in this research is descriptive analysis with qualitative and quantitative parameters including exploration, characterization and relationship analysis. Exploration activities were carried out in two districts on Lombok Island, namely North Lombok District (Kayangan) and Central Lombok District (East Praya), Indonesia. Each variety of morphological characteristics was observed according to the Guidelines for Characterization and Evaluation of Rice Germplasm from the National Germplasm Commission. Cluster analysis was performed by cluster analysis using agglomerative methods carried out on morphological quantitative and qualitative characteristics of vegetative and generative parts of local Lombok rice. The local rice used are seven varieties namely pare jarak, pare putek, pare nanas (local of North Lombok District); reket liang, reket lobak, reket bireng and reket lomak (local of Central Lombok District). Exploration results obtained that the local rice of North Lombok District is rain-fed rice, while the local rice district of Central Lombok is lowland rice planted as a border crop for the main crop, VUB rice. The results of relationship analysis with cluster analysis showed that seven varieties were divided into two major groups, namely pare and reket varieties (99.60%). Pare jarak and pare nanas have the closest relationship (99.92%) in the pare rice group, while reket liang and reket lobak have the closest relationship (99.91%) in the reket rice group.

Character, Lombok local rice, relationship, variety

AO-13

Profile of organic and conventional rice field microbe community with metagenomic analysis using Next Generation Sequencing (NGS)

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Organic farming according to research by some scientist can increase diversity and soil microbial activity. This research aimed to find out the profile of organic and conventional rice field bacteria community in early (0 DAP), mid (15 DAP) and late period (45 DAP) fertilization with metagenomic analysis using Next Generation Sequencing (NGS) subsequently the possibility it has an impact on soil quality. The highest OTUs number of microbe is 3558 found in organic rice field at 45 DAP. There are 9 genera found based on 10 genera in high relative abundance, 98% include Bacteria while the rest Archaea namely genus *Methanosetae*. Bacteria of Firmicutes (genus *Clostridium* which has 5,693% relative abundance, genus *Bacillus* (3,183%), and genus *Lactobacillus* (1,692%)); Proteobacteria (genus *Defluviicoccus* (3,696%), genus Buchnera (3,667%), genus *Rosenbergiella* (0,002%) and Actinobacteria (genus *Nocardioides* (1,083%), and Streptomyces(0,572%)). Soil microbe was thought to play role in improving soil quality. This information will be useful for environmentally sustainable agriculture.

Organic, metagenomic analysis, Next Generation Sequencing, soil quality, OTUs number

AP-01

Cytotoxicity and genotoxicity of n-hexane and ethanol secondary metabolite of api-api leaves extract (*Avicennia marina*) with mitotic index and chromosome aberration as indicator in onion roots (*Allium cepa*)

Sri Rejeki Rahayuningsih[1,♥], Tri Mayanti[2], Annisa[1], Nining Ratningsih[1], Fidela Histiya Gunawan[1]

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[2]Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran. Jl. Raya Bandung-Sumedang Km. 21, Jatinangor, Sumedang 45363, West Java, Indonesia

Avicennia marina (Forssk.) Vierh. is a mangrove that had secondary metabolites which can be used by the community as herbal medicine. Cytotoxicity and genotoxicity test needs to be done to determine the toxicity of *A. marina*. This study aimed to test cytotoxicity and genotoxicity of secondary metabolites in n-hexane and ethanol *A. marina* leaves extract. The study was conducted using the experimental Complete Random Design (CRD), one factor with four levels of concentration: 125, 250, 500 and 1000 ppm and negative control of distilled water solution and positive control of EMS solution, with 4 repetitions for each treatment. The parameters observed were: mitotic index, onion root growth, and chromosome aberration. The results of the observations were analyzed with ANOVA Ft (α.05), and continued with the Duncan Ft (α.05) test. The n-hexane extract of *A. marina* leaves was

cytotoxic to onion roots and concentrations only at 500 and 1000 ppm give genotoxic effects. Ethanol extract of *A. marina* leaves was cytotoxic and genotoxic to onions roots, with concentrations of 500 and 1000 ppm giving sub-lethal effects. Chromosome aberration obtained were broken, bridge, double bridge, c-mitosis, delayed anaphase, diagonal anaphase, disoriented, giant cell, laggard, loss, micronucleus, multipolar anaphase, polyploidy in anaphase, ring, star, sticky, vagrant, lesion, and double lesion.

Avicennia marina, chromosome aberration, cytotoxicity, genotoxicity, mangrove

AP-02

Evaluation of mungbean lines for resistance to Cercospora leaf spot and powdery mildew disease in the greenhouse

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Mungbean is an important food crop, it is a source of carbohydrates, protein and vitamin B. Therefore production must be increased. In increasing the production of mungbean, there are several constraints including disease infection. Leaf spot and powdery mildew are the main diseases on mungbean. Planting the resistant varieties to leaf spot/powdery mildew is an effective, easy, and inexpensive way. The aim of research is to get some resistant mungbean lines against leaf spot and powdery mildew disease. The research was conducted in the greenhouse of the Indonesian Legumes and Tuber Crops Research Institute, from May to September 2019. Evaluation of the resistance of mungbean lines to leaf spot and powdery mildew was carried out consecutively. The material tested was 20 mungbean breeding lines from the breeding section, with one resistant variety and one susceptible variety as a check. Inoculation was done by spraying the suspension of *Cercospora cruenta* spores of leaf spot, or *Erysiphe polygoni* spores of powdery mildew, with a density of 104 spores/mL in the afternoon. Observation of the intensity of leaf spot or powdery mildew disease is carried out three times, starting at one week after the first symptoms appeared. The results showed that out of 20 mungbean lines tested, there was no line that resistant, 7 lines were moderately resistant and 13 lines were moderately susceptible to leaf spot disease. Out of 20 lines of mungbeans tested, 8 lines were resistant and 12 lines were moderately resistant to powdery mildew.

Leaf spot, mungbean lines, powdery mildew, resistance

AP-03

Morpho-agronomics variability on groundnut (*Arachis hypogaea*) germplasm and its prospects for cultivar improvement

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Groundnut (*Arachis hypogaea* L.) improved cultivars in Indonesia are developed in various ways, mostly, 71.1% of all the improved cultivars developed through artificial crosses followed by selection. The figure indicated the germplasm importance in cultivars development. Important agronomic characteristics of improved groundnut cultivars are seed size, maturity days, and pod yield. Groundnut domestic production is still lower than national demand, as is productivity. Therefore program for increasing cultivar productivity is still needed. Improvement of plant yield components to increase productivity through development ideal plant type requires information on the character required in the germplasm collection. The study was conducted to asses groundnut germplasm variability and its prospect for using in the breeding program. Evaluation was conducted in Jambegede Exp. Farm, Malang, during the dry season of 2018. Three hundred germplasm accessions were used in the study, each accession was planted in two rows of 5 m row length, 50 cm x 10 cm planting space, one plant per hill. Fertilizers Phonska 300 kg/ha + SP36 100 kg/ha were entirely applied at planting time. Measurements were made on plant, pod, and seed characteristics, pod yield, and yield components. High pod yields are obtained from accessions that have larger pod sizes and seed sizes and relatively higher plant postures. The high variability and high mean values indicate good prospects for cultivar improvement. Among those accessions, MLGA 0559, MLGA 0119, and MLGA 0059 are the most prospective ones.

Arachis hypogaea, cultivar, germplasm, groundnut, morpho-agronomics

AP-04

Leaf anatomy and phytochemical comparative of endemic *Globba* spp. (Zingiberaceae) from West Sumatra, Indonesia

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Zingiberaceae is a big family with approximately consisted of 50 genera and 1300 species. This family is divided into four tribes, among others: Alpiniae, Globbae, Hedychieae, and Zingiberae. *Globba* is the largest genus belong to Globbae tribe, and the third largest genus in Zingiberaceae.

Sumatra and Kalimantan were the central biodiversities of *Globba* in Indonesia. In this study, four endemic species of *Globba* had been collected from West Sumatra and observed for their leaf anatomy characters and phytochemical comparative, among others: *Globba albobracteata, G. leucantha, G. astrosanguinea*, and *G. pendula*. The comparative observation of leaf anatomical and phytochemical properties in this genera from Sumatra for taxonomic approaches have not been studied well. The stomata tracing was made by using clear nail polish and transverse sections of leaf were made manually by razor blade as thin as possible. The anatomy characters were observed using light microscope. The phytochemical properties were analyzed and determined by GC-MS method from the leaves ethanol extract. The results showed that the anatomical characters in the four species of *Globba* had a relatively high variations in characteristic observation, including stomata size, epidermal size, stomata index, stomata density, presence of trichomes, trichomes type, type of vessel bundle at midrib, leaf edge type, tissue structure in the lamina and phytochemical composition.

GC-MS, *Globba*, leaf anatomy, phytochemistry, taxonomy

Diversity of Species

BO-01

Ex-situ population of White-Rumped Shama: Density, distribution and bird fanciers

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Nowadays, white-rumped shama (*Copsychus malabaricus*) is positioned as expensive pets and widely nurtured among Indonesian especially in Bengkulu City, Indones[ia]. Origin of bird which is kept by fanciers still unclear, whether it is the result of captive breeding program or capture from wild. The purpose of this research was to estimate the population of white-rumped shama which are kept by Bengkulu's bird fanciers, analyze its population density, population distribution, and the profile of its fanciers. Researcher used field observation method by conducting interviews during June-September 2019. Respondents were determined using purposive sampling method and sampling was continued by snowball sampling method. Bird population data were analyzed by using population density formula and population distribution formula, while profile of fanciers was analyzed descriptively. In 9 subdistricts of Bengkulu city totally of 642 birds that are kept in ex situ habitats, consisting of 434 males and 208 females with sex ratio approximately 2:1. Population density was 4.23 birds per km^2 (2.86 male birds/km^2 and 1.37 female birds/km^2). Population distribution by a Variance-Mean Ratio formula was 4.8 or VMR > 1. Furthermore, there were 79 fanciers consist of 78 male fanciers (98.7%) and 1 female fancier (1.27%). Eleven fanciers (13.9%) were categorized as captive breeders and 68 fanciers (86.1%) were categorized as bird lovers. Average age of fanciers was 37.14 years old. In conclusion, density population of ex-situ white-rumped shama in Bengkulu City was 4.23 birds per k m^2, and population distribution interpreted as negative binomial distribution. Bird fanciers were divided into two groups, captive breeders and bird lovers.

Bird fancier, density, distribution, ex situ population, White-Rumped Shama

BO-02

The study of ectoparasites on blue swimming crab (*Portunus pelagicus*) from Ketapang and Bangka, Indonesia

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Parasites are potential species that can be used as biological indicators. In addition, parasites provide information on biology aspects of host including stock separation, migration, eating habits and eating behavior, stock connectivity, phylogenetic and systematic. The parasites found in the crab's body are called endoparasites and parasites outside are called ectoparasites. This study aimed to identify ectoparasites in blue swimming crab (*Portunus pelagicus*) from Ketapang (West Kalimantan, Indonesia) and Bangka (Bangka Belitung, Indonesia) waters, Indonesia. Ectoparasites were observed by observing target organs (carapace, swimming legs, walking legs, claws, and gills). Morphological observation of parasitic samples was conducted under a microscope. The identification results were confirmed through molecular identification with DNA barcoding techniques. There were four species of ectoparasites found from both locations namely *Chelonibia* sp., *Octolasmis* sp., *Thompsonia* sp. *and Anelasma* sp. Ectoparasites *Thompsonia* sp. was not found in Ketapang waters, while *Anelasma* sp. was not found in the waters of Bangka Belitung. The highest intensity value (1437) was owned by *Thompsonia* sp. which infected blue swimming crab in Bangka waters. The highest prevalence (17%) was owned by *Octolasmis* sp. which infected blue swimming crab in Ketapang waters.

Blue swimming crab, ectoparasites, identification, intensity, prevalence

BO-03

The inventory of medicine-potential vegetation type in the forest area of four oxbows Buluhcina Nature Tourism Park, Riau, Indonesia

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The research was conducted in the Forest Area of four Oxbow Buluhcina-Kampar Nature Tourism Park, Riau, Indonesia from March to July 2019. This research aims to look at the vegetation diversity of the medicinal plants. Samples of this survey research were selected using a purposive sampling technique. The research sites included the riparian areas in Tanjung Putus Lake, Baru Lake, Pinang Luar Lake, and Pinang Dalam Lake. The research parameter is the diversity of the medicinal plant. The data collection process is through tranced method and 20mx20m plotting. The data analysis aspects include vegetation composition, medicinal plants, and physical-chemical factors. This study found that there are nine medicine-potential vegetation types in the forest area of four Oxbow Buluhcina Nature Tourism Park. Oxbow Pinang Forest Area is the area with medicine-potential vegetation mostly found compared to the other three oxbow areas. This is caused by the area that is still well-maintained and that has not been touched by the outside environment. Parts that can be utilized as medicine are almost all parts of the plants, from the roots to the leaves, as they are useful to cure various types of diseases.

Buluhcina, medicine-potential vegetation, oxbow

BO-04

The diversity of growth and mutant selection short-stem of M2 generation mentik wangi rice resulted from gamma-ray irradiation

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Mentik wangi is local rice variety derived from Magelang, Central Java, Indonesia. This rice has superior properties, which is tender texture, has fragrant aroma and white, but also has a long harvesting age and tall stems so that it easily collapses during heavy wind. This study aims to obtain short stem mutant plants. The study was conducted using a simple design experiment and the data were analyzed using descriptive then continued with T-test. The results showed that the mentik wangi M2 rice had lower plant height than the control. There were improvements in other characteristics such as harvest age, flowering age, number of seed per panicle, and M2 mutant selection. M2 selection obtains 11 mutant plants from irradiation with 150 Gy, 22 plants mutant from irradiation with 200 Gy, and 24 plant mutant from irradiation with 250 Gy that have short stems and high productivity.

Irradiation, mentik wangi, mutation, selection

BO-05

The growth diversity of M2 generation of mentik wangi susu rice result of gamma-ray irradiation into short stem selection

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Mentik susu is local rice from Magelang, Central Java, Indonesia. On the side of the Mentik Susu rice has advantages, but this local rice has the disadvantage of relatively high stems and long life. One way to overcome the weakness of mentik susu rice is by mutating plants using gamma rays. The objective of this research was to study and select M4 mutants of mentik susu rice with 100 Gy and 200 Gy gamma-ray irradiation which had short stem and had high productivity properties. The research carried out by using a simple experiment design then the data were analyzed descriptively and followed by the T-test analysis. The results showed that M4 mentik susu rice results of gamma-ray irradiated had lower stems, shorter flowering and harvesting age, and higher productivity than mentik susu rice non-irradiated (controls). The range of M4 mutant that has short-stem is 80.25-91.25 cm. The flowering and harvest age of M4 mutant is 55 days after sowing and 87-90 days after sowing. The productivity range of M4 mutant is 21.52-81.51 gram. The results of individual M4 mutants selection are obtained 15 plants that had short stems and high productivity.

Local variety, mutant, selection

BO-06

Density of cellulose-degrading bacteria at maturity in Teluk Bakung Peat Area, Ambawang Subdistrict, Kubu Raya District, Indonesia

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Cellulose degrading bacteria was one of the microbial removers of organic matter contained in the soil into simpler monomers so that it can be utilized by other organisms. The objective of the research is to obtain cellulose-degrading bacteria at maturity peat in forest and shrubs (oil palm). The bacteria were isolated by pour plate method on carboxymethyl cellulose (CMC) media 1%. The bacterial were assay to hydrolyze of cellulose base on clear zones. Selected isolates were assayed quantitatively based on the activity of cellulase enzyme, identified with 16S rDNA. Cellulose bacterial density at the level of peat maturity was significantly different, sapric peat had the highest density. Among 19 isolates of cellulolytic bacteria, there were 7 which have clear zones around the colony as degradation of cellulose and isolates (SB1.1.1, SH1, SB2.3, HH1.3.3, HH3.1.1, and HS3.5.1) had highest ability to degrade cellulose with clear zones of 5-7 mm. The strain of SB1.1.1 has the highest activity of cellulase enzyme 11,17 U/mL, followed by HH3.1.1 strain and SB2.3 7,83 U/mL.

Cellulose bacteria, oil palm, peat maturity

BO-07

Morphological characterization of endophytic fungi from kratom (*Mytragina speciosa*)

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Mytragina speciosa Korth. (Rubiaceae) is one of the important plants in Southeast Asia. There is a limited study of endophytic fungi on kratom. The aim of the research was to isolate and identify the as fungi from kratom. The triple surface sterilization methods were conducted to isolate the fungi from leaves, stalk, stem, and root. *Phyllosticta* is one of the dominant fungi found from leaves and stalk of the kratom. Other fungi were found on the root and stem. The *Phyllosticta* and other fungi were illustrated in this study. Kratom has many advantages for pharmaceutical, health, biofertilizer, functional food and other usages in the future.

Endophytes, fungi, morphology, *Mytragina speciosa*, *Phyllosticta*

BO-08

Echinoderms diversity in Porok Beach, Gunung Kidul, Yogyakarta, Indonesia

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Porok Beach is located in western region of Gunung Kidul, known as the research station of Faculty of Biology, Universitas Gadjah Mada, Yogyakarta, Indonesia which is not developed as tourism area. The intertidal structure of this beach consists of coral, sand and several parts forming a pond and almost the entire coral surface covered by macroalgae. This research conducted in extreme dry rainy season in August 2019. In this beach has been found various kinds of echinoderms. The variety of echinoderms in Gunung Kidul coast, especially Porok Beach, is not widely identified. The aim of this research is to determine the diversity of echinoderms on that beach. Sampling was executed by using purposive random sampling method, then the sample was further preserved and identified. The results obtained from this study were several species from Echinoidea class namely *Heterocentrotus trigonarius*, *Echinometra oblongata*, *Diadema antilarum*, *Tripneustes gratilla*, *Tripneustes ventricosus*, *Stomopneustes variolaris* and *Echinotrix calamaris*, Ophiuroidea class namely *Ophiocoma scolopendrina*, *Ophiomastix annulosa*, and *Marophitrix longipeda*, Holothuroidea class namely *Holothuria atra* and *Holothuria impatiens*, Asteroidea class namely *Anthenea* sp.. This study found 7 species of Echinoidea, 3 species of Ophiuroidea, 2 species of Holothuroidea and 1 species of Asteroidea class.

Diversity, echinoderms, intertidal, Porok Beach

BO-09

The effect of surrounding vegetation on the diversity and abundance of buzzing pollinators of eggplant (*Solanum melongena*) flowers

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To collect pollen from poricidal anthers, like in most Solanaceae, is that the insects need to perform buzzing to get the pollen, by vibrating the flowers in order to expel pollen from the small opening at the tip of the flowers. Only certain species of insects that are able to perform buzzing behavior, thus the aims of this study were to determine both species composition and abundance of visiting insects to the eggplant flowers and to identify buzz pollinating insects. We also looked at the differences in species pollinating insects of the eggplants at three types of vegetation found surrounding the eggplant. The survey took place 15 eggplant gardens with three microhabitat types, i.e., the eggplants grown in polyculture gardens, in monoculture eggplant gardens near forest and in eggplant gardens lacked wild vegetation. The observation took place for 10 minutes interval for each plant, out of five plants observed in each location, starting at 8 am and ended at midday. Results showed that there were eight species of insects were identified performed buzzing to extract the pollens. Flower sex and insect species, as well as the interaction of surrounding vegetation, flower sex, and insect species, affected the abundance of visiting insects.

The visiting insects of the eggplant which lack trees were dominated by Halictidae and *Xylocopa confusa*, while in the polyculture garden the pollinators were dominated by *Nomia* sp, *Tetragonula laeviceps*, *Apis cerana* and *X. confusa*, the eggplants grown in monoculture gardens were dominated by *A. cerana*. Thus, the composition of surrounding vegetation of the eggplant garden affect which species did the buzz pollination.

Buzzing, pollen, poricidal anthers, *Solanum melongena*

BO-10

The distribution and size structure of three Asian horseshoe crab in Balikpapan Coast, Indonesia

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Horseshoe crabs are known as living fossil animals. There are four species scattered around the world. Coastal waters in Indonesia are important distribution areas of Asian horseshoe crabs. The aim of this study is to determine the distribution of Indonesian horseshoe crabs and their size structures in Balikpapan Coast, East Kalimantan, Indonesia. This study was conducted from October to November 2019. Horseshoe crab was captured using net and directly along the coast. The body weight and prosomal width ware measured, moreover sex of each individual was determined. Three species of horseshoe crabs exist in Balikpapan coast, namely *Carcinoscorpius rotundicauda*, *Tachypleus gigas*, and *T. tridentatus*. Based on the results, the mean body weight and prosomal width of female horseshoe crabs are higher than males for all species. The heaviest bodyweight that was found in Balikpapan coast is *T. tridentatus* both female 3090,80±500,93g and male 1098,22±255,64g. However, the smallest size is *C. rotundicauda* 175,00±64,98g for females and 101,83±22,73g for males. Furthermore, allometric analysis showed that all of the species both female and male have isometric growth patterns except for female *C. rotundicauda* who have allometric positive growth. Therefore, Balikpapan coast is one of the coastal waters that have all Asian horseshoe crab species.

Asian horseshoe crab, Belangkas, Balikpapan coast, habitat

BO-11

Determination of good morphological characters of *Tachypleus tridentatus* to distinguish with *T. gigas* in Balikpapan coastal area, Indonesia

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Horseshoe crabs are the merely surviving xiphosurans and categorized as living fossils. Indonesia is blessed to have the latter three species of four. Horseshoe crabs population size in Indonesia is lacking, but it can be obtained through voluntary monitoring program. This study was aimed to reveal best morphometric characters for practical identification to distinguish *Tachypleus tridentatus* with *T. gigas*. The study was conducted in Balikpapan coast. 105 individuals of *T. tridentatus* were collected from January-March 2018 and 15 individuals were obtained from 23 October-15 November 2019. Generally, three spines in posterior of opisthosoma have been used in practical identification of *T. tridentatus*. However, in this study, two phenotype forms of tiny spine were found. 13.33% of total samples had one tiny spine and 86.67% had three tiny spines in the posterior of opisthosoma. Blood samples analysis from two specimens with one spine and two specimens with three spine both male and female using CO1 showed that all samples are *T. tridentatus*. This confirmed that three tiny spines in posterior of opisthosoma could not be used as morphological characters for *T. tridentatus* identification. Therefore, small spines on opisthosoma to be good characters to distinguish *T. tridentatus* with *T. gigas*.

Balikpapan, horseshoe crab, identification, opisthosoma, practical small spines

BO-12

Unique notes on herpetofauna checklist of Tanjung Una EP5 Sanga-Sanga Field, East Kalimantan, Indonesia

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Tanjung Una, East Kalimantan, Indonesia is the location of Pertamina's oil production. The area includes the Mangrove swamp ecosystem affected by sea tides, although the salinity rate is relatively low. Some animals contained in the ecosystem include herpetofauna which is an important record because the previous survey was never conducted. Carried out by the method of direct encounter on some survey points intentionally in the middle of the forest and seaside. Recorded 7 species of frogs and 14 species of reptiles present in Tanjung Una with some unique notes beyond the alleged of 4 species of herpetofauna include: *Fejervarya cancrivora, Limnonectes paramacrodon, Takydromus sexlineatus* and *Varanus salvator.*

Frogs, mangrove, reptiles

BO-13

Study on diversity of termites based on altitude in Gombong karst area of Kebumen, Central Java, Indonesia

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Karst area of Southern Gombong on 0-500 m asl, is a porous substrate area with homogenous production forest of teak, *Tectona grandis* next to the Hindia Ocean's beach. The habitat is characterized by falling of canopy of teak trees in dry season (April-October) every year. But how this abiotic factor affects the species richness of termites had not been studied. The aims of this research to reveal how does the diversity of termites on this karst area, what is the pattern of this diversity in line to the altitude. The method used was sampling based on belt transect.(L=100m, W=2m) layed on forest habitat. Each transect divided into 20 sections, then the termites sampled on living tree, branch, bark, litter, and soil in each section. The richness species of termites were analyzed by Shannon-Wienner index (H¢), Shannon-Evenness index (E), and Simpson's Domination index, and correlation of the richness species and abundance of termites to the altitudes. The result showed the four species of termite found, with the pattern of the richness and abundance were maximal on the mid-altitude. The diversity and evenes index are 0,478 and 0,345, and they were categorized low, and no domination of species, with domination index was 0.391. The conclusion was the diversity of termites in The karst area of Southern Gombong showed the phenomenon of mid altitudes affect.

Diversity, karst, richness, Gombong, termites

BO-14

Abundance of *Cherax quadricarinatus*, an invasive alien species in Lido Lake, Bogor, Indonesia

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Indonesia is a mega biodiversity country in the world including native aquatic species. Some alien species could be a problem for aquatic biodiversity. The red-claw crayfish or lobsters, *Cherax quadricarinatus*, is native in freshwater habitats of Australia. Unfortunately, *C. quadricarinatus* is also recognized as invasive, having already established wild populations in some lakes in Indonesia. The research was conducted to investigate the abundant of *C. quadricarinatus* as alien species in Lido lake, Indonesia. The research was conducted in September (dry season), October (transition) and February (wet season). Forty traps were installed along the lake line. Traps were set during the day and collected the next day. Caught lobsters were counted and marked on the carapace with nail paint and then the lobsters were returned to the lake. The Schnabel mark-recapture method is used in calculating abundance The result showed that the abundant of *C. quadricarinatus* was higher in October (N=2285) and February (N=2295) compared with September (N=519) and the abundant of *C. quadricarinatus* was higher than native crustacean species, *Macrobrachium sintangense*, in Lido Lake. There were different patterns of *C. quadricarinatus* sex ratio between September and February. It was the first evidence that *C. quadricarinatus* could be an invasive alien species in Lido Lake, Indonesia.

Cherax quadricarinatus, invasive, Lido lake

BO-15

Tree health status of saga (*Adenanthera pavonina*) in the campus area of Universitas Sumatra Utara, Medan, Indonesia

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Saga (*Adenanthera pavonina* L.) is a multipurpose tree species that grows in the campus of Universitas Sumatra Utara (USU), Medan, Indonesia. The multipurpose tree will optimally be obtained if the tree is healthy. The purpose of this study was to assess the health status of saga trees that grew in the USU campus. Research was conducted by census method to 153 saga trees. The health monitoring was performed using Forest Health Monitoring (FHM) method. Two indicators are used to assess the health status of saga tree, namely damage indicator and crown indicator. The results showed, there were 6 (six) types of damage that occurred on saga trees, those were: cancer, decay further, open wounds, leaves discolorization, loss of dominant tip

and broken or dead branches. Based on its health status, 4 trees (2.61%) are in the very healthy category, 35 trees (22.88%) are in the healthy category, 88 trees (57.52%) are less healthy and 26 trees (16.99%) are in unhealthy category. The damage index value for saga trees at USU campus is commonly on moderate category, so maintenance activities are needed to improve tree health and avoid unwanted incidents.

Adenanthera pavonina, crown indicator, damage indicator, saga, tree health status, Universitas Sumatra Utara

BO-16

Effect of grazing on α and β 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 2×2 m plots (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. We estimated diversity (spatial turnover represented by the mean Bray-Curtis index) and α diversities in each plot in grazed and ungrazed areas. The results showed that β diversity of vegetation was higher, and that of the seed bank was lower for grazed than ungrazed plots. Grazing led to a decrease in α diversity in both vegetation and soil seed bank.

Sheep grazing, soil seed bank, species turnover

BO-17

Echinacea purpurea morphological diversity resulted from cultivation in Karangpandan, Central Java, Indonesia

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Echinacea purpurea (L.) Moench is a medicinal plant introduced from North America, has not been widely developed in Indonesia. This plant has a native growing habitat in the 4-season country, where the conditions for optimal growth are low temperatures and full sun intensity. Solutions that can be done to meet these needs are domestication and conduct research by planting at different altitudes, which will increase the yield of *E. purpurea*, but this solution followed by high morphological diversity problems. The purpose of this study is to determine the adaptation and morphological variations of *E. purpurea* and afterward select the best *E. purpurea* growth performance. This experimental research used a Randomized Completely Group Design (RCBD) with a single factor, namely accessions of *E. purpurea*: A1, A2, A3 planted at Karangpandan (middle land). The accessions used previously obtained from the mass selection of Research and Development Center for Medicinal Plant and Traditional Medicines (B2P2TOOT) Tawangmangu experimental garden (high land) in 2011. The observations carried out qualitatively and quantitatively. The data obtained were analyzed using SPSS 21.0. The results showed that 3 accessions had diversity on Flower color of A1 is deep pink, A2 has a pale pink color, but A3 is dark purple. A1 has flower shapes that tend to be flat downward and slightly dense, A2 tends to curve downward, and while A3 has flowers that tend to be flat but the flower petals are rather sparse. Qualitative observations showed that there is a significantly different effect on plant height, plant weight, number of leaves, number of flowers, root weight, length of root, and number of branches of *Echinacea*. The conclusion is there is a morphological diversity of *E. purpurea* when they are planted in different locations or conditions.

Echinacea purpurea, morphological diversity

BO-18

The effect of drastically environmental temperature changes on evisceration of sea cucumber *Holothuria scabra*

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The temperature changes drastically often occur in sea cucumbers *Holothuria scabra* environmental life, both in natural and artificial environments condition (example: artificial spawning with thermal shock). This study aims to determine the effect of drastic changes of temperature on the evisceration of *Holothuria scabra*. A total of seven treatments were observed in this study (drastic changes in environmental temperature of 0, 2, 4, 6, 8, 10 and 12 ˚C). Each treatment was tested on 18 individuals. Observations have been made on the number, time of evisceration and weight of organ. The results of this study showed that the number and time of evisceration were significantly different ($p < 0.05$) in each treatment. Changes in temperature of 2 to 6°C do not cause evisceration but evisceration starts at changes in temperature 8 to 12°C. The

highest and fastest evisceration occurs at a temperature change of 12°C that is 50% and begins to occur in the first minute. Organ removed consists of digestive organs (intestine), gonads and water. The weight of organs removed ranges from 10.51 g to 130 g (average weight 64.08 g). The weight of water expended ranges from 5.00 to 297.00 (average 58.02 g)

Digestive organ, evisceration, *Holothuria scabra*, temperature

BO-19

Distribution and new county records of the golden chicken fern *Cibotium barometz* in South Sumatra, Indonesia

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The golden chicken fern, *Cibotium barometz* (L.) J. Sm. (Cibotiaceae), is a medicinal tree fern which has been included in Appendix II of CITES (Convention on International Trade in Endangered Species). Globally, the populations of *C. barometz* are significantly under pressure, due to the overexploitation for international trade. Therefore, survey and monitoring of *C. barometz* in its natural habitat should be carried out annually. The aims of the study were: (i) to inventory *C. barometz* in South Sumatra Province; (ii) to study the distribution and ecology of *C. barometz*; and (iii) to assess its population size by using random search methodology incorporating belt line transects. New county records of distribution of *C. barometz* in Sumatra were discovered. Two variants of this species are recognized, viz. the golden yellow and golden brown variants. This species is distributed in three localities of the hilly secondary forest of Pagar Alam City, South Sumatra, Indonesia at 685-993 m asl.: (i) Bukit Kayu Manis (North Dempo Sub-District); (ii) Lematang River (South Dempo Sub-District); and (iii) Prau Dipo Field (South Dempo Sub-District). The average population density of *C. barometz* in Bukit Kayu Manis, Lematang River, and Prau Dipo Field were 30, 2 and 3 plants per 100 m^2, respectively. The population size of *C. barometz* in Bukit Kayu Manis was the highest, 4500 individuals in the areas of 1.5 Ha.

Cibotium barometz, distribution, ecology, medicinal tree fern, population size

BO-20

Gut content analysis of horseshoe crab, *Carcinoscorpius rotundicauda* and *Tachypleus gigas* collected from Java sea coastal area, Indonesia

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Horseshoe crabs are one of the living fossil animals in Indonesia. This study aims to determine the food habits of horseshoe crab at Demak coast, Central Java, Indonesia and Sumenep coast, East Java, Indonesia. Horseshoe crabs are captured using fishing gear, mini trawl for Demak coast and gill nets for Sumenep coast. The next step is measuring the width of the prosoma and body weight, after that analyzed of gut contents with the frequency of occurrence methods, volumetric methods and preponderance index. *Carcinoscorpius rotundicauda* prosoma widths ranging from 7.3-14.8 cm and *Tachypleus gigas* prosoma widths ranging from 7.9-23.5 cm. The results that have been obtained from the analysis of the gut contents of horseshoe crabs, there are six kinds of food are bivalves, gastropods, polychaetes, echinoderms, crustaceans, and unidentified. Based on the preponderance index in Demak coast, bivalves are the main food of *Carcinoscorpius rotundicauda* and the main food for *T. gigas* is polychaetes. Whereas in Sumenep coast the main food is gastropods for *Carcinoscorpius rotundicauda* and *T. gigas*. Therefore, it can be concluded horseshoe crabs in the coastal of Demak and Sumenep are omnivores which tend to be carnivores.

Carcinoscorpius rotundicauda, *Tachypleus gigas*, index preponderance, gut content, northern Java

BO-21

Vegetation analysis and characterization of purslane (*Portulaca oleracea*) at different altitudes in East Java, Indonesia

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The purpose of this study is to identify the composition of vegetation and characterization of purslane (*Portulaca oleracea* L.) at various altitudes in East Java, Indonesia. Vegetation analysis is used to determine weeds that have natural ability to control growth facilities and living space, determine the distribution of certain plants, and can identify specific species and observe the morphology of purslane vegetation. So far, purslane is considered a weed, but actually has a high content and nutritional value. Purslane has been shown to contain omega-3 fatty acids five times higher than spinach. The research method used in the determination of sample plots and vegetation analysis used in the survey is the quadratic method. Observational plot 1 x 1 m2 (trees), 25 x 25 cm^2 (herbs) and 10x10 cm^2 (grass). Number of sample plots 10. Observation of morphological characteristics was carried out directly on sample plants in all study locations. Morphological characteristics observed included the characters of roots, stems, leaves, flowers, and seeds. The results showed that (i) habitat found 6 tree species, 12 herbaceous species, and 5 grass species, (ii) the highest importance index value of purslane (*Portulaca oleraceae* L.) and ginting grass (*Pennisetum purpureum* Schamach), (iii) Distribution patterns in the lowlands and cluster high, while the plain is uniform.

Altitude, analysis of vegetation, characterization, purslane

BO-22

Success rate of hatching *Batagur borneoensis* egg and best predictors growth of hatchling turtle at Pusung Kapal Village, Aceh Tamiang, 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±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

Epiphytic plankton on macroalgae in the intertidal zone of Pananjung Pangandaran, West Java, Indonesia

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Epiphytic plankton is microscopic organism that lives sessile on the substrate in the water. This plankton community can form epiphytic interactions with various types of substrates in its ecosystem, one of which is macroalgae. This study examines the composition of epiphytic plankton species on macroalgae substrate in Pananjung Pangandaran beach, West Java, Indonesia, and their abundance. There are 14 species of host plant macroalgae being observed, represented 3 divisions. Samples of macroalgae had taken from 3 study sites, purposively, which refers to the species with the highest important value index of each division. Plankton identification results obtained 31 species of phytoplankton and 15 species of zooplankton from all host plant macroalgae. The abundance level of epiphytic plankton that lives on thallus macroalgae shows a varied pattern, indicated by the percentage of epiphyte abundance that is not evenly distributed in each host plant macroalgae species. Different types of host plant macroalgae have a significant influence on the composition and abundance of epiphyte species, both phytoplankton, and zooplankton. The connection between the phytoplankton type with the abundance of zooplankton epiphytes produces a significant value and gives the possibility of interspecific interactions between phytoplankton and zooplankton, in terms of trophic level in the intertidal zone, thus food web as well.

Epiphytic plankton, macroalgae, host plant

BO-24

Antioxidant activity and phenolic content on three varieties of ginger (*Zingiber officinale*) combination with *Cinnamon burmanii* and *Caesalpinia sappan*

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Based on RISKESDAS 2018, proportion of Diabetes Mellitus increases two times than 2013 in Indonesia. Over 380 people were confirmed diabetic in the world. Current study showed that dietary of fruits and vegetables containing antioxidants have associated with the reduction of the risk of many chronic diseases such as diabetes and cardiovascular. Plant phenolic compounds can act as antioxidants individually or in combination. *Zingiber officinale*, *Caesalpinia sappan*, and *Cinnamomum burmanii* have phenolic compound, however less information about antioxidant activity and total phenolic content in this combination especially in Aqueous extraction method. This research was descriptive quantitative and aimed at determining the content of phenolic compounds and antioxidant activity of three varieties of ginger (*Z. officinale*) combination with *C. burmanii* and *C. sappan* in aqueous extraction method. Phenolic compounds test was conducted by utilizing Folin Ciocalteu method; while antioxidant activity test was performed by DPPH method. Both tests used UV Spectrophotometer VIs technique. Based on ANOVA three varieties of ginger combination with *C. burmanii* and *C. citratus* have higher total phenolic content and antioxidant activity compared to *Z. officinale* without combination.

Antioxidant activity, extraction, ginger, phenolic content

BO-25

Biological and ecological assessment of conservation and aquaculture development of *Trigonostigma heteromorpha* in Bintan island, Indonesia

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Harlequin fish, *Trigonostigma heteromorpha* are freshwater ornamental fish which are widely exported and are on the IUCN Redlist Status. *T. heteromorpha* is included in the Least Concern (LC) category. This fish culture activity has not been successful. The needs of fish consumers are obtained from the catch in nature. This study aims to analyze the biological and ecological parameters as basic information for the development of aquaculture and biodiversity conservation. The results showed that these fish have sizes ranging from 1.5 to 4.5 cm and their growth patterns are allometric with a value of b = 2.6. The ratio of body length to intestinal length is 1: 0.74. The percentage of intestinal content is 40% water insects, 35% zooplankton, 15% phytoplankton, 7% worms and 3% algae, indicating that the fish is an omnivorous species. Fecundity ranges from 45-88 eggs. The average fecundity is 68 items. Fish egg diameter ranges from 0.7 to 0.95mm.

Harlequin fish, Bintan Island, food habits, reproduction, *Trigonostigma heteromorpha*

BO-26

Biodiversity of Zingiberaceae under the stand of *Gyrinops versteegii* var. *longistipis* community in Tibuambung Hill, West Lombok, Indonesia

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The Tibuambung hill, West Lombok, Indonesia are the distribution areas of *Gyrinops versteegii* var longistipis trees, which grows together with other plants such as *Harpulia cupanioides, Gymnacranthera farqu-hariana, Sandoricum racemosa, Syzygium polyanthum, Alstonia scholaris, Artocarpus heterophyllus, Calophyllum soulattri, Gnetum gnemon, Sandoricum racemosa, Syzygium polyanthum, Eugenia malaccensis*, and *Dyzyxum parasitic*. They are a community of *G. versteegii* var *longistipis* trees. This community has a specific habitat, so plants species under that stands, also have a unique diversity, including ginger plant species (Zingiberaceae). This study aims to identify ginger plant species (Zingiberaceae) found under the stands of *G. versteegii* var. *longistipis* community. The results show that there are 9 species belonging to 5 genera of *Zingiber*aceae, i.e. *Zingiber* (*Z. zerumbet, Z. officinale, Zingiber* sp.); *Amomum* (*A. compactum, Amomum* sp.); *Alpinia* (*A. galanga*); *Etlingera* (*E. elatior*); *Curcuma* (*C. aeruginosa, C. heyneana*).

Community, *Gyrinops versteegii*, ginger plants, Lombok, Zingiberaceae

BO-27

Variations of somatotype in the middle-aged of Baduy People, South Banten, Indonesia

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Somatotype is a universal method of appraising body shape, structure, and composition. The variation of somatotype indirectly provides usefully to understand the physical, the level of metabolism, and health conditions. The studies are mostly conducted at the growth phase and rarely carried out at the middle-aged population. Though, it

also is a productive age, which needs good physical performance. A cross-sectional study was conducted on a subject of 167 Baduy People, South Banten, Indonesia (117 women and 50 men) of age from 31 to 50 years. Sex differences can be seen in endomorphy (subcutaneous fat), which is generally higher in women. Results of study showed that we found an age-related increase of endomorphy and mesomorphy until aged 40-41 years in both sexes (women and men) and decline after that. Ectomorphy (linearity) develops to be the third component and opposite with other components in women. However, it tends the second-highest component and stable in men. The results also showed that the distribution of somatotype category is on the mesomorph area in both sexes (mesomorph-endomorph in women; balanced mesomorph in men). Overall, mesomorphy (as musculoskeletal robustness) develops in both sexes, which is probably due to the physical and professional activity as a farmer (in swidden cultivation) during this age range.

Baduy people, body composition, body shape, somatotype

BO-28

Comparative study of leaf anatomy of *Etlingera* spp. (Zingiberaceae) from East Indonesia

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Etlingera is large genera belong to Zingiberaceae Family. It is consisted of 150-200 species and distributed from northeast India, Asia, Southeast Asia and extending to the Pacific island. Indonesia is one central diversity of *Etlingera* and Bali Botanic Gardens as research center and ex-situ conservation institution had collected and conserved several *Etlingera* spp. from east Indonesia. In this study, five species of *Etlingera* from plant collection of Bali Botanic Garden was observed and determined their stomata characters and the leaves anatomy. The species included *Etlingera rubroloba*, *Etlingera mamasarum*, *Etlingera* sp.1, *Etlingera hemispaerica*, and *Etlingera elatior*. The stomata tracing was made by using clear nail polish and transverse sections of leaf were made manually by razor blade as thin as possible. The characters were observed using light microscope. The stomata characters consisted of the length and width of stomata, stomata index, stomata density, and stomata type. While leaf anatomy characters consisted of epidermal cell shape, midrib, petiole, and leaf margin. The results show that *Etlingera* spp. from east Indonesia has various characters such as the shape and size of outliners of petioles and midribs, the arrangement of vascular tissue, type of leaf margin, and the presence of hypodermal layer in adaxial and abaxial epidermis in lamina. This research was expected to add taxonomical information on *Etlingera*.

East Indonesia, *Etlingera*, leaf anatomy, Zingiberaceae

BO-29

Education-tourism strategy as a means for Javan Lutung conservation in Perhutani Areas of Malang (KPH Malang), East Java, Indonesia

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Javan Lutung or Ebony Leaf Monkey (*Trachypithecus auratus*) (VU) is endemic to the islands of Java, Bali, and Lombok, of Indonesia. The main threats for this species are poaching, forest degradation and forest conversion into arable land. One of the areas where Javan Lutung can be found in East Java is in forest areas owned by Perhutani in BKPH Tumpeng, KPH Malang. Perhutani, a state-owned company has started to incorporate tourism as one of its revenue streams in addition to timber. Our work aimed at developing education-tourism strategy for the conservation of Javan Lutung in Perhutani areas in East Java. To develop the strategy, we collected the following data: Javan Lutung distribution data, habitat characteristics, and stakeholders' perception and knowledge regarding Javan Lutung's ecological function and ecosystem services provided by the habitat. Line Transect Method with distance sampling was used to survey the primate's distribution and population size. For vegetation sampling, we used Point Centered Quarter Method. Stakeholders perception and knowledge on ecosystem services and Javan Lutung's ecological functions were solicited through face to face surveys. A SWOT analysis based on the data collected was performed to assess the strategy. The research found that there are two potential sites to be developed for education-tourism taking into account the Javan Lutung's distribution, topography, and distance from the entrance. The interviews with stakeholders revealed that both the community and Perhutani are favorable towards education-tourism. Most local communities are aware of forest functions as water regulator. However, some local communities are afraid of Javan Lutung and perceived Javan Lutung as pest. Based on our analysis, below are the strategies we propose: (Strength-Opportunities) Strategy: The education-tourism should be built on forest function as water regulator as this is the issue that the local community can relate to. (Weaknesses-Opportunities) Strategy: The education-tourism should visualize Javan Lutung's ecological function related to its function in seed dispersal in the forest. (Strength-Threats) Strategy: The education-tourism activities should involve/empower the local community particularly those practicing poaching so that they can get alternative income. (Weaknesses-Threats) Strategy: Capacity building for the Perhutani officials regarding the management of education-tourism sites and activities.

Ebony Leaf Monkey, socio-ecological survey, education-tourism, Perhutani, SWOT

BO-30

Morphological diversity and anthocyanin content some varieties of black rice local on-field rice agroecosystem in the highlands

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This study aims to determine the morphological diversity and anthocyanin content of some local varieties of black rice cultivated on-field rice agroecosystem in the highland. This research was conducted in Karanglo, Tawangmangu, Karanganyar, Indonesia with altitude of 665 m. asl. Black rice data described descriptively then analyzed cluster with NTSYS program. The result showed that all varieties of black rice Cempo Ireng, IPB and Gagak had same qualitative morphological characters. The diversity of morphological characters appear on quantitative characters include leaf length, plant height, stem length, thick node, number of panicles per clumps, panicle length, number of culms, number of grains per panicle, grain length, caryopsis length, and root length. Dendrogram analysis showed similarity coefficient between 0.84-0.90). The highest anthocyanin content of black rice varieties owned by Cempo Ireng with an average of 521.97 ppm anthocyanin content, Gagak 128.81 ppm, and varieties of IPB has a total anthocyanin content of 110.7 ppm

Anthocyanin, black rice, diversity, morphological characters

BO-31

Existence of local Fafoe onion and in situ conservation for sustaining biodiversity in Malaka District, East Nusa Tenggara, Indonesia

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Endangered one species because of various natural processes that take place in conditions that are not suitable for the growth of these plants. But on the other hand, there are efforts of local people who continue to grow to maintain and even develop these plants. Fafoe's local onion commodity is an endangered onion plant species from Malaka District, East Nusa Tenggara, Indonesia. In these conditions, there are still some farmers who are actively developing local Fafoe onions on their farming. This study aims to (i) Know the management status of local variety onion farming (ii) Conserve local Fafoe onion from extinction, (iii) Know the status of farming management of local Fafoe variety, (iv) Know the Agronomic Potential of Fafoe local onion. This research was conducted in Fafoe Village, Malaka District, East Nusa Tenggara, Indonesia. The method used the survey method and field observations. The results showed that the plant of local Fafoe onion has been cultivated by the community in the village of Fafoe since 150 years ago, was once a cash-producing commodity for the community and a major source of income. But until now this plant has only been cultivated by 4 farmers in the Malaka District. This plant has a large tuber with diameter up to 14 cm and a weight/clove up to 31.1 gram/clove.

Conservation, onion, status

BP-01

Efficacy of control technology components against peanut pod borer, *Etiella zinckenella*

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Etiella zinckenella Treitschke is important pest on peanut, causing damaged on pod up to 100%. This study aims to determine the efficacy of control technology components against *E. zinckenella*. The experiment was conducted in Natar (Lampung, Indonesia) and Muneng (East Java, Indonesia) with 11 treatments and three replicates. The result showed that pod borer population and the level of damaged pod and seed occurred in Natar were higher than that occurred in Muneng. The highest population in Natar and Muneng was found on plot with no application of control technology (T0) and plot with the single application of lambda-cyhalothrin (T10). However, T1, T2, and T3 were not found in larval populations both in Natar and Muneng. The damaged pod that occurred in Natar was high (43.7-76.3%). However, in Muneng, the damaged pod was low (0.2-2.6%). The highest level of damaged pod found in Natar was on T0 (76.33%) and Muneng was on T5 (2.64%). However, the lowest damaged pod was found on T1 both in Natar (43.7%) and in Muneng (0.2%). In conclusion, T1 was quite effective to suppress the population of peanut pod borer and their damage. This component could be considered to be applied for controlling them, especially in endemic locations.

Biological control, chemical control, control technology, *Etiella zinckenella*, efficacy

BP-02

Impact of biopesticide inundation on major soybean pests and diseases

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Soybean pests and diseases are quite abundant and have shown resistance to chemical pesticides. Biopesticides are biological agents derived from plant-based pesticides and microorganisms. Its effective for controlling pests and diseases as well as suppress the resistance and resurgence. This research aims to study the impact of biopesticide inundation on soybean pests and diseases. The study was conducted in Banyuwangi, East Java, Indonesia from March to July 2018. Biopesticides applied were *Trichoderma harzianum* (Trichol 8), neem seed powder, entomopathogenic virus SlNPV (Virgra), entomopathogenic fungi *Beauveria bassiana*, and eugenol from clove oil. The results showed that biopesticide applied by inundation can suppress *Sclerotium rolfsii, Phakopsora pachyrhizi, Xanthomonas axonopodis,* and *Spodoptera litura.* The application of biopesticides by inundation is safer and can maintain the survival of natural enemies and can reduce yield losses. However, the application of chemical can kill natural enemies. *Oxyopes* sp., *Coccinella* sp., *Sycanus* sp., *Andrallus* sp., *Rhynocoris* sp., *Paederus* sp., *Entomobrya* sp., *Aphidius* sp., *Binodoxys* sp., *Encarsia* sp., *Tricchogramma* sp., and *Telenomus* sp. which survived on-field applied with biopesticides is quite abundant. Therefore, natural enemies have a great opportunity as biological agents for controlling soybean pests and diseases and as an alternative to replace the use of chemical

Biological agent, biopesticide, control technology, efficacy, inundation

BP-03

Current population and ecological preference of the Ghost Orchid *Didymoplexis pallens* Griff in Bogor Botanic Gardens, Indonesia

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Didymoplexis pallens Griff. is a terrestrial orchid that has a leafless characteristic. The growth of *D. pallens* is still a mystery because it only grows in specific areas and at certain times. This study aimed to explain the growth in its natural habitat and determine the requirements for its growing sites. The study was conducted in Bogor Botanic Gardens, Indonesia where *D. pallens* grow naturally. The results provided that *D. pallens* has a large population and grows abundantly around specific bamboos, such as *Gigantochloa verticillate, Gigantochloa atroviolacea* and *Dendrocalamus giganteus*. In addition, the presence of *D. pallens* populations is thought to be strongly influenced by the presence of other plants that compete around it. Light intensity affects this orchid growth. Furthermore, based on the results of a statistical analysis conducted with Principal Component Analysis (PCA), it revealed the abiotic factor that influences the existence of *D. pallens* was divided into two components. The first component consists of air temperature, air humidity, and soil humidity. The second component consists of litter thickness and canopy cover.

Leafless orchid, suitable habitat, protected area

BP-04

The palm diversity in Mount Slamet, Central Java, Indonesia

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The palm is a group of plants that is widespread in the world, including in Indonesia. The existence of a palm population that occupies a limited area only in certain scopes. The aim of this study was to reveal the existence of palm populations that occupy Mt. Slamet, Central Java, Indonesia from various sides, namely the southern slope, the eastern slope, the western slope, and the northern slope. The method used is purposive sampling method by making a plot measuring 10x10 m based on the palm population found along the climbing path on each slope. The total plots that were successfully made on all four slopes were 236 plots. The results showed surprising results because there were significant differences in the palm population on each slope. The palm population on the southern slope is revealed to have the highest species richness and abundance with the dominance of *Pinanga javana*. Meanwhile, on the eastern slope, there is no palm population. The palm population on the western slope and northern slope is not much different because the number of species found is almost the same. This research also can finally conclude that the habitat on the southern slope is in the most stable condition.

Inventory, Java, *Pinanga javana,* palm, montane forest

BP-05

Identification of nematode gastrointestinal parasite in Bali cattle (*Bos javanicus javanicus*) from Taman Ayu Village, West Lombok District, Indonesia

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Nematode worms are one of the helminth groups that have wide distribution in ruminants. Various types of nematode worms are known as infected cattle and have affected their health. The aim of this research was to determine the species of gastrointestinal nematode worms in cattle that are raised in Taman Ayu Village, Gerung Subdistrict, West Lombok District. A total of 115 stool samples were collected from February to August 2018 in 3 sub-village that have high cattle population in Taman Ayu Village. Sampling was carried out by random sampling method in cattle cage. fecal samples were examined using native and floatation methods to determine the number of species of gastrointestinal nematode worms. The results of examination of the samples found 5 species of parasitic nematode worms as *Strongyloides papillosus*, *Trychosrtongylus* sp., *Haemonchus contortus*, *Toxocara vitulorum*, and *Trichuris* sp. *Strongyloides papillosus* is the species higher infection than other species, because this species can be transmitted by autoinfection. A large number of cattle in each cage allows transmission between cattle. Low breeders' knowledge of good raised systems and bad sanitation causes hight numbers of nematode worms in fecal samples.

Gastrointestinal parasites, nematode, Taman Ayu

BP-06

Non-domesticated vegetable species of Lombok Island (Indonesia) and implication to their conservation and utilization

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An inventory of the local vegetable used by the local people in Lombok Island, Indonesia has been done in 2017 and 2018, especially to the minor species. The methods used are by interview the local people in Lombok and looking for the species for documentation and identification. The sample representing the 4 districs in Lombok Island. The minor vegetable species was mainly found in Central Lombok close to Praya, while other local people outside Central Lombok District used the common/domesticated vegetables. We listed ten species which are used as minor vegetable in Central Lombok i.e *Centella asiatica* (all part), *Cleome rutidosperma* (all part unless root), *Chynanchum dimidiatum* (young leaves, shoot, flower, and fruit), *Dregea volubilis* (young leaves, flowers, and young fruit), *Paederia foetida* (young leaves), *Premna foetida* (young leaves), *Smilax* sp (tuber), *Solanum* sp (young leaves and flower)., *Trichosanthes dioica* (young leaves, shoot and young fruit), and *Zingiber zerumbet* (young leaves and shoots). The part used was from tubers/rhizome, young leaves, flowers, and young fruit. The minor local vegetable was occasionally sold in the traditional markets, especially for Bujak (*Zingiber zerumbet*), Kepere (*Chynanchum dimidiatum*) and Bebante (*Dregea volubilis*), but now kepere nad bebante become very rare and not found again in traditional market. All listed minor vegetable was not domesticated yet, some of them also have medicinal properties. The conservation aspect of these species is needed and a conservation strategy was is proposed.

Ethnobotany, food diversity, food security, local food, minor vegetable

BP-07

DNA Barcode of *Dendrocygna javanica* (Horsfield, 1821) from North Sumatra, Indonesia, based on mitochondrial DNA Cytochrome Oxidase Subunit I

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DNA barcoding based on the Cytochrome oxidase subunit I (COI) gene, mitochondrial DNA is very useful in identifying *Dendrocygna javanica* (Horsfield, 1821) from North Sumatra, Indonesia. The purpose of this study was to analyze the ability of COI gene mitochondria in identifying *D. javanica* from Indonesia. We sequenced the DNA barcodes 7 *D. javanica* from North Sumatra, Indonesia. Seven blood samples from the *D. javanica* species were isolated and analyzed. Slight variations can be observed in the *D. javanica* COI sequence. Conversely, significant differences occur at the genus and family levels. The COI gene sequence produced from this study, shows results that are unmatched by the BoLD System database. All individuals tested using the BoLD System database have similarities between 99.16% to 100%. This fact shows that the availability of nucleotide sequences from the COI gene from *D. javanica* in the BoLD System database. The results of the phylogenetic analysis showed that the seven *D. javanica* samples used in the analysis clustered with *D. javanica* species. The analysis showed that *D. javanica* was separated from the species in the genus *Denrocygna* and separated from the species in the Anatidae family. This COI sequence *D. javanica* from Indonesia is a novel to identify *D. javanica* from Indonesia. We encourage its use for rapid identification in efforts to prevent illegal hunting and conservation of *D. javanica* in Indonesia.

Barcode, COI, *Dendrocygna javanica*, DNA, North Sumatra, Life Data System

BP-08

Agro-morphological characteristic of garlic (*Allium sativum*) varieties grown at tropical highland of Sembalun, Indonesia

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Vegetative propagation is the most common garlic cultivation method in Indonesia due to unsuitable tropical environment conditions for garlic to develop seed. Sembalun Highland of West Nusa Tenggara Province, Indonesia is one of national bulb seed production centers established since 2017. This study aimed to evaluate agro-morphological characteristics of five garlic varieties grown at Sembalun Highland. The experiment was laid out in Randomized Complete Block Design with six replication at Sembalun Bumbung Village from June to October 2018. All varieties were characterized from eighteens samples at mature stage for plant weight and height, number leave, leaf length and shape, pseudostem diameter, bulb weight, polar and equatorial diameter of bulb, number of cloves per bulb, average weight of 10 cloves, plant habitus, shape of mature bulb, bulb structure type, shape of the compound bulb in horizontal section, yield per hectare, and number of days to mature. All varieties were characterized by their morphological characters. Tawangmangu Baru and Lumbu kuning were morphologically close to Sangga Sembalun that native from Sembalun. Average yield of Sangga Sembalun was the highest (11.52 t/ha), followed by Lumbu Kuning (9.93 t/ha) and Tawangmangu Baru (9.89 t/ha), Lumbu Hijau (8.66 t/ha), and the lowest was Lumbu Putih (5.74 t/ha).

Agro-morphological, *Allium sativum*, highland, Sembalun, tropical

BP-09

Morphological qualitative characterization of Kantong Semar (*Nepenthes* sp.) di Indonesia

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Nepenthes spp is one of the unique and interesting flora that has been developed as an ornamental plant for long time ago. 78% of the world's *Nepenthes* population can be found in Indonesia, especially in Borneo and Sumatra. This research aims to describe the qualitative character of 15 genotypes are *N. treubiana, N.insignis, N.jacqueline, N.eymae, N.undulatifolia, N.rafflesiana, N.longifolia, N.neoguenensis, N.tobaica, N.hirsuta, N.adnata, N.maxima wavy, N.albomarginata, N.maxima,* and *N.adrianii* collected from the nurseries in Riau, Surabaya, Tulungagung, and Pontianak during April-May 2019. There are 31 qualitative characters of *Nepenthes* including stem color, leaf arrangement, leaf layout, leaf shape, leaf bone composition, leave base, leaf edges shapes, leaf tip shape, leaf surface, upper side leaf color, lower side leaf color, midrib leaf, leaf stalk, leaf stalk shape, leaf bone color, pitcher shape, wax zone color, absorption zone color, inner pitcher color, pitcher opening shape, pitcher opening color, spurs, spur color, pitcher cover color, pitcher cover shape, pitcher wing, pitcher wing color, hairy wings, tenure color, tenure surface, and spur branches. The result showed that each observed pitcher plant genotype had different qualitative characters.

Morphology, *Nepenthes*, qualitative

BP-10

Community of fruit bat (Pteropodidae) in Gadjah Mada University campus, Yogyakarta, Indonesia

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One of the fruit bat (Family Pteropodidae) foraging habitats is an urban area. Gadjah Mada University, Yogyakarta, Indonesia built and developed a green space area with many types of plants. This research aims to know the community of fruit bat by counting the success trap of their samples and relation between each species of fruit bat with their plant attractor at Gadjah Mada University. This research begins from September 2018 until September 2019 with a purposive sampling method. Samples of fruit bat collected using the mist net trap at 8 points of the representative area while samples of plant attractor collected using point centered quarter method (PCQM). The result of this research is a community of fruit bat in the Gadjah Mada University consists of 2 population, there are *Cynopterus* brachyotis and *Cynopterus* horsfieldii with population ratio 2:1. The success trap between the population of C. brachyotis and *C. horsfieldii* is 0.75 and 0.5. The population size of *C. brachyotis* higher than *C. horsfieldii*. Out of 33 plant species, 7 of them are *Ficus. Ficus* spp. as plant attractor (food sources) and affected the success trap amount. There is no significant difference between the food of *C. brachyotis* and *C. horsfieldii*.

Cynopterus, *Ficus*, fruit bat, mist net trap, Pteropodidae, success trap

BP-11

Diversity of species and population of pests, diseases and natural enemies in soybean as an impact of biopesticides application

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Soybean pests and diseases are quite abundant and have shown resistance to chemical pesticides. Biopesticides are biological agents derived from plant-based pesticides and

microorganisms. Its effective for controlling pests and diseases as well as suppress the resistance and resurgence. This research aims to study the impact of biopesticide inundation on soybean pests and diseases. The study was conducted in Banyuwangi, East Java, on March-July 2018. Biopesticides applied were *Trichoderma harzianum* (Trichol 8), neem seed powder, entomopathogenic virus SlNPV (Virgra), entomopathogenic fungi Beauveria bassiana, and eugenol from clove oil. The results showed that biopesticide applied by inundation can suppress *Sclerotium rolfsii, Phakopsora pachyrhizi, Xanthomonas axonopodis,* and *Spodoptera litura*. The application of biopesticides by inundation is safer and can maintain the survival of natural enemies and can reduce yield losses. However, the application of chemical can kill natural enemies. *Oxyopes* sp., *Coccinella* sp., *Sycanus* sp., *Andrallus* sp., *Rhynocoris* sp., *Paederus* sp., *Entomobrya* sp., *Aphidius* sp., *Binodoxys* sp., *Encarsia* sp., *Tricchogramma* sp., *and Telenomus* sp. which survived on-field applied with biopesticides is quite abundant. Therefore, natural enemies have a great opportunity as biological agents for controlling soybean pests and diseases and as an alternative to replace the use of chemical.

Biological agent, biopesticide, control technology, efficacy, inundation

Diversity of Ecosystem

CO-01

Analysis of suitability and carrying capacity of the mangrove ecosystem area for ecotourism development in Lembar Villagem, West Lombok District, Indonesia

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Mangrove ecosystems in the Lembar area, West Lombok District, West Nusa Tenggara, Indonesia have a high ecological role and as a pilot area for mangrove conservation and rehabilitation activities. In 2015 the area was developed into a mangrove ecotourism area as an appropriate form of utilization to ensure the sustainability of the conservation and economic of the local community. The purpose of this study was to analyze the suitability and carrying capacity of the area for the development of mangrove ecotourism. The data collection method is done directly. The data analysis method used is the analysis of tourism suitability index and the carrying capacity of the area. The results of the data analysis showed that the Lembar Village mangrove ecosystem area was included in the suitable category to be developed as a mangrove ecotourism at stations I, II and III with a value of ecotourism suitability index of 77,78%, while those at stations IV and V were categorized conditional suitable with the ecotourism suitability index value of 42,22%. Carrying Capacity of the area is 2337 people/day with tourist attractions consisting of mangrove tracking (33 people/day), fishing (137 people/day), picnic (1620 people/day), camping ground (542 people/day) and bird watching (6 people/day)

Carrying capacity, ecotourism, mangrove, suitability

CO-02

Isolation and selection of cellulolytic bacteria from rice straw for consortia of microbial fuel cell

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Rice straw is one kind of biomass with high cellulose content that can be utilized as Microbial Fuel Cell substrate. The aim of this research was to get a degrading cellulose bacteria with high capability and able to be used as consortia with exoelectrogen bacteria in microbial fuel cell. The stage to get potential cellulolytic isolate to encompass: (i) isolation stage using carboxymethyl cellulose (CMC) agar medium, (ii) selection isolates by determination cellulolytic capability, oxygen tolerance, antagonistic test with exoelectrogen bacteria, enzyme assay, and MFC performance test, (iii) identification of selected isolate. A total of 23 isolates were obtained to form clear zones on CMC media with the highest ratio of clear zone value to diameter colony of 6.23. Then, 10 isolates of anaerobic facultative bacteria were selected. The antagonistic test resulted in three isolates were not antagonistic with exoelectrogen bacteria. Three isolates were tested for exoglucanase (Avicel) assay and total enzyme activity (Filter Paper) and the highest activity was 6.21 U/mL and 5.88 U/mL, respectively. The best MFC performance was achieved by one isolate, J401, with voltage value of 40.8 mV and power density of 0.33 mW/ m^2. J401 was identified using 16S rRNA method and the result similar to *Xanthomonas* sp.

Bacteria, cellulase, cellulose, decomposition

CO-03

Analysis of community structure and potential of soil insects as bioindicators in various ecosystem types in Lombok, West Nusa Tenggara

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There are various types of ecosystems that can be found in Lombok island, Indonesia with the dominant ones being natural forest ecosystem, mangrove ecosystem, mixed garden ecosystem, rice field ecosystem, and mining ecosystem. In these ecosystems, there are unique flora and fauna communities with high biodiversity, including soil insects that partake in the process of energy flow in the ecosystem. This study aims to analyze the potential of soil insects as bioindicators in various types of dominant and unique ecosystems in Lombok island. The data collection was done using pitfall traps, yellow pan traps, and baited pitfall traps. The findings showed that there are 60439 individuals, 79 families and 16 orders of insects in various types of ecosystems. Diversity (H') and evenness (E) index values for family level in all ecosystem types are low on average (H'=0.76 and E=0.10). The family of Cerambycidae (Coleoptera) is a potential bioindicator in the forest ecosystem, and the family of Trichogrammatidae (Hymenoptera) is a potential bioindicator in the mangrove ecosystem. In the garden ecosystem, however, the potential bioindicator could not be found since the distribution of the family is almost even. As for the rice field ecosystem, the potential family as a bioindicator is the Cicindelidae (Coleoptera) family. The Tenebrionidae (Coleoptera) and the Acroceridae (Diptera) families are soil insects with relatively high abundance and are found only in the mining ecosystems.

Bioindicators, ecosystem types, Lombok, soil insects

CO-04

Vegetation analysis of the Forest Park of Pocut Meurah Intan (THRPMI), Seulawah Subdistrict, Aceh Besar, Aceh Province, Indonesia

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The aims of this research were to known vegetation structure and composition in Forest Park of Pocut Meurah Intan, Seulawah Subdistrict of Aceh Besar, Aceh Province, Indonesia. This research has been conducted from April 2019 to November 2019. A transect method and squares were used in this study. The transect method was used to record species composition throughout the observation stations (inventory of species), including stands of pine (*Pinus merkusii*) with 10 stations transect, stands of eucalyptus (*Eucalyptus urophylla*), stands of cacao (*Theobroma cacao*), and natural forests within a radius of 2 km around the THRPMI office. The squares method was used to record the species in the same locations to replicate each station by 10 squares of samples for vegetation analysis. The parameters measured in the field were frequency, density, and dominance of each species. Analysis of vegetation covered Importance Values (IP), Diversity Index (H '), and the Similarity Index (SI). Results showed that there were 49 families found with the composition of species in the entire observation stations comprising of 111 species with 58 species of trees, 12 species of shrubs, and 41 species of herbs. Additionally, the results showed that the species of vegetation with the highest IP were coarse grass (*Imperata cylindrica*), lawn pait (*Axonopus compresus*), and selasi (*Vernonia cinerea*) with IP of 72.01, 65.34, and 57.24, respectively. Results of analysis Species Diversity Index (H ') showed that the *P. merkusii* had H' of 2,134, whereas *Eucalyptus urophylla* had H 'of 1.965, and *Theobroma cacao* had H' of 1,067. The results of the analysis of Community Similarity Index showed that all stations had the relative same SI of 75%. Based on these facts it can be concluded that the species composition of the study area dominated by tree species, species diversity index (H ') in all observation stations varied ranging from 1.067 to 2.134, and the relative Community Similarity Index was 75%.

Forest Park, vegetation analysis, importance value, species diversity index, community diversity index

CO-05

Tree architecture models of hospitals in Banda Aceh, Aceh Province, Indonesia

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The aim of this research was to known architectural models of tree grown in several hospitals of Banda Aceh City, Aceh Province, Indonesia. A squares method to assess tree architecture model was used in the research. A sample quadrate consisting of 5 plots with sizing of 10 m x 10 m (tree strata) was made in each sampling area. Results showed that there were 51 species belonging to the 28 families found in the research areas. Four species showing the greatest percentage of attendance were *Pterocarpus indicus* (5.8%), *Rosystenia regia* (5.19%), *Mangifera indica* (5.19%), and *Tamarindus indica* (4.54%). The tree architectural model found in the research area were; Troll models, models Roux, Corner models, Koriba models, Nozeran models, Schoute models, Attims models, Champagnat models, Rauh models, Thomlison models, Aubreville models, Cook models, Leuwenberg models, Mc Clure models, Scarrone models, and Stone models. The most dominating architectural model was the Corner

models with a total of 13 species followed by Troll models with 11 species.

Tree architectural model, hospitals

CO-06

Analysis of heavy metal content (Cu, Zn, Cd, Cr, Pb, and Ni) on roots, stems, and mangrove leaves in Karangsong Coastal, Indramayu District, Indonesia

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The Karangsong mangrove conservation of Indramayu District, West Java, Indonesia area is planted with the type mangrove vegetation such as *Avicennia marina*, *Rhizophora apiculata*, *Rhizophora mucronata* and *Rhizophora stylosa* which have the potential as heavy metal bioaccumulation that pollutes the waters of the eastern coastal area of West Java. This study aims to compare the content of heavy metals (Cu, Zn, Cd, Cr, Pb, and Ni) that accumulate in the roots, stems and leaves of 4 types of mangroves (*A. marina*, *R. apiculata*, *R. mucronata*, and *R. stylosa*). The content of heavy metals in the roots, stems and mangroves leaves was analyzed in the laboratory of SEAMEO BIOTROP using Atomic Absorption Spectrophotometer (AAS) for Cu, Zn, Cr and Ni and ICP MS (for Cd and Pb). Root samples taken for research are entering the sediment, mangrove stems are taken from the main branching stems or the skin of the trunks affected by tides, whereas the mangrove leaves taken from medium mangrove leaves. Each sample (root, stem, leaf) is taken as much as 2 kg (wet weight). The research result showed that the highest accumulation ability of heavy metals is found in the roots of type *A. marina* with Zn, Cu, Cd, Cr, Pb, and Ni content are 35 ppm, 9.4 ppm, 2 ppm, 9.1 ppm, 11 ppm, and 19 ppm, consecutively. Based on bioconcentration, ability of *A. marina* to accumulate heavy metals is high.

Heavy metal content, Karangsong, mangrove

CO-07

Assessment of land use impact on peat soil microbial community function in Bukit Batu, Riau: Community-level Physiological Profiling (CLPP) application

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Peatland conversion into plantation, settlement, and agricultural activities affects the physicochemical properties of peat soil which will ultimately impact the microbial community function. This study was aimed to determine the microbial cell number and the microbial community function in peatland conversions into various types of vegetation in Bukit Batu, Riau, Indonesia. Peat soil was taken from the Secondary Forest (SF), Society Yard (SY), ±18-year-old Oil Palm Plantation (OPP-18), ±19-year-old Rubber Plantation (RP), ±9-year-old Oil Palm Plantation (OPP-9), and ±45-year-old Rubber Forest (RF). The microbial cell number was calculated by using total plate count method and the microbial community function was determined by using Community-level Physiological Profiling (CLPP) method. The bacterial cell number ranges from 0.48-1.89x106 CFUg-1 of soil, and the fungal cell number ranges from 1.7-4.6x104 CFUg-1 of soil which the highest cell number is found in SY site. CLPP analysis showed that the microbial community function is relatively similar in all soil sampling sites. But, there is a tendency that the SY site exhibits the highest community activity compare to other sites. Statistical analysis using Principal Component Analysis (PCA) shows that SY site tends to be different from other sites.

CLPP, peatland, microbial cells number

CO-08

Population and diversity of soil microbial on some peat land-uses in West Kalimantan, Indonesia

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Soil microbial activity has an important role in keeping ecosystem health. The changing in common ecology condition due to land conversion was affecting the declining abundance and diversity of soil microbial. This research was aimed to determine the dynamic population of bacteria and soil function as well, due to land-use conversion in 2-time periods (2016 and 2017). The soil samples have taken from peat-land Rasau Jaya 1, Kubu Raya District, West Kalimantan Province, Indonesia with four land-uses i.e. corn cultivation, oil palm plantation, shrubs and secondary forest. The areal observation included land condition, water table depth and peat maturity. The number of soil samples is 20 with total bacteria and fungi analysis used the plate count method and population of bacteria and fungi analysis used microscopic identification method. The result of the study showed that land-use was not significantly ($p<0.05$) affected total bacteria (0.36) and fungi (0.80). Total bacteria in corn cultivation, oil palm plantation, shrubs and secondary forest are 324 x 10-5 cfu/mL, 447 x 10-5 cfu/mL, 275 x 10-5 cfu/mL and 311 x 10-5 cfu/mL, respectively. While total fungi are 22 x 10-5 cfu/mL, 12 x 10-5 cfu/mL, 28 x 10-5 cfu/mL and 20 x 10-5 cfu/mL, respectively. There were

found eight types of bacteria on corn cultivation, oil palm plantation and secondary forest, while five on shrubs. Moreover, there were found five species of fungi in corn cultivation, shrubs and secondary forest, namely *Penicillium, Rhizopus, Fusarium, Trichoderma* and *Aspergillus*; and four species in oil palm plantation namely *Penicillium, Rhizopus, Fusarium* and *Trichoderma*.

Land-use, peat-land, soil microbial

CP-01

Use of Analytic Network Process in zoning review of Sembilang National Park, Banyuasin, South Sumatra, Indonesia

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Sembilang National Park, South Sumatra is one of the largest wetland conservation areas in Indonesia. As a conservation area with the main ecosystem in the form of a±87,000 ha mangrove ecosystem, Sembilang National Park is managed based on a zoning system that is utilized for research, science, education, supporting cultivation and tourism. At present, the zoning of Sembilang National Park consists of core zones, jungle zones, utilization zones, traditional zones, rehabilitation zones, and special zones. The predetermined zones need to be evaluated because the damage to the national park is continuing so that the mangrove forest area in Sembilang National Park has shrunk from 98,583 ha in 2012 to 90,691 ha in 2017. The purpose of this study is to determine the zoning of Sembilang National Park by using the analytical network process (ANP) method. The results showed that the main criteria in determining national park zones based on ecological aspects were the presence of peat domes, typical ecosystems, and land cover conditions. While the right social indicators are access to conservation areas and the existence of settlements.

Analytical network process, Sembilang National Park, Zoning criteria,

CP-02

The efficacy of several repellent plants on *Thrips* sp. population and attack intensity on chili plant

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he research sets to describe several plants as repellent in controlling *Thrips* sp. population on chili plant (*Capsicum frutescens* L). The research employed experimental method with Randomized Completely Block Design. There were 3 kinds of repellent plants, they were basil, marigold, and shallot. The first, chili plants were treated by basil. The second was treated by marigold and the third was treated by shallot. The techniques applied for this treatment was by placing the chili in the middle and surrounding it with the repellent plants. For the controlling chili, there was no repellent used. The data were analyzed by Analysis of Variance at 5% significance level. The result showed that the lowest population and attack intensity from *Thrips* within the chili plant was from basil treatment, in this case, basil plant was the most effective repellent for *Thrips* sp. Moreover, marigold treatment showed that it can be used as an alternative repellent for controlling Trips sp.

Basil, chili pant, marigold, repellent, *Thrips*

CP-03

Predicting the potential distribution of endemic *Selaginella* (*Selaginella willdenowii* and *Selaginella intermedia*) under climate change in Southeast Asia

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Two endemic species of selaginellas from western Malesia region, i.e. *Selaginella willdenowii* (Desv.) Bak. and *Selaginella intermedia* (Bl.) Spring., have been used as traditional medicine and consumed as vegetables. But, their existence is potentially disrupted by global climate change due to their need for water as a medium for fertilization. This study aimed to model the distribution of potential habitat for S. w*illdenowii* and S. *intermedia* and evaluate the impact of climate change on the distribution of those potential habitat, by utilizing MaxEnt machine learning to model its potential distribution based on occurrence records and environmental variables (including soil, sun radiation variables, topographical variables, and bioclimatic variables). Future projections were generated under four climate projection scenarios (i.e., RCP 2.6, RCP 4.5, RCP 6.0, and RCP 8.5) over three-time intervals (2030, 2050, 2080). We encourage future modeling attempts to incorporate potential human-induced land use/land cover changes, more detailed ecological data, biotic interactions between species in the regional ecosystems, and better sampling of presence data which accurately represent the

variability of ecological niche of species. Despite all of presented limitations, this study provides the baseline of understanding the potential effect of climate changes on the distribution of predicted suitable habitat for S. *willdenowii* and S. *intermedia*. Therefore, based on the results, it is concluded that the sustainability of S. *willdenowii* and S. *intermedia* potentially will negatively be affected by all of the scenarios of future climate conditions presented in this study and there will be a significant shift of predicted suitable habitat onto higher elevation areas.

Climate change, endemic, *Selaginella willdenowii, Selaginella intermedia*

Ethnobiology and Socioeconomics

DO-01

Looking insight the use of orchid plants by communities living in and around Cycloop Mountain Nature Reserve and the borderline of Indonesia and Papua New Guinea

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Study on orchid utilization as non-timber forest products by local communities living in and around Cycloop Mountain Nature Reserve (CMNR), Jayapura, Papua, Indonesia was conducted through direct observation and interview with orchid enthusiasts and key respondents in twelve villages that purposively selected, i.e. Maribu, Sentani, Angkasa, Waena, Abepura, Kotaraja, Angkasa, Pasirdua, Skouw Mabo, Skouw Yambe, Arso-11 dan Arso-Swakarsa. Two main genera of *Bulbophyllum* and *Dendrobium* are the most common usable orchids recognized during the observation and sold out from the nurseries or screen house of respondents. These genera have been intensively extracted from the natural habitat in CMNR. Records indicate that the hunting of orchid by locals mainly as ornamental plants and the products are sold as income to meet household needs. Users of orchids are identified as hunters, traders, buyers, and collectors. According to traders, *Bulbophyllum foetidum, Bulbophyllum grandiflorum, Bulbophyllum phalaenopsis, Dendrobium antennatum, Dendrobium anosmum, Dendrobium conanthum, Dendrobium lasianthera, Dendrobium lineale, Dendrobium macrophyllum, Dendrobium moschatum, Dendrobium pseudoconanthum, Dendrobium schulleri, Dendrobium smillieae, Dendrobium spectabile,* and *Dendrobium violaceoflavens* are frequently requested for orchid exhibition by the users. Intensity of orchid that has been extracted from the natural habitat is presumably high, so that this will bring the implication for its conservation in sustainable endeavors.

Cycloop Mountain Nature Reserve, ethnobotany, orchids, sustainable uses

DO-02

Crossed locations combined analysis of variance FMA (Fungi Mycorrhizal Arbuscular) consortium on the growth characteristics three *Jatropha curcas* cultivar

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Indonesia has a very extensive marginal land area. One type of marginal soil is inceptisol, with a limiting factor for low soil chemical fertility, especially the phosphorus element. The element P can become available to plants with the help of fungi mycorrhizal arbuscular (FMA). The purpose of this study is to present a statistical analysis of variance combined sensitivity (combined analysis) across sites based on topography with different FMA consortium granting of the characteristics three *Jatropha curcas* cultivars growth. The experiment was conducted at the same time in two different places based on differences in topography (as lowland and middle land) in 2019. The experimental design used is a randomized block design (RBD) simple pattern which consists of fifteen combinations of treatment. Number of treatment combinations 15 were repeated 2 times. The research result shows interaction between FMA consortium treatment and location of the enzyme content of phosphate. The interaction between the combined treatment IP-3A cultivars with applications of FMA consortium 7.5 g/polybag with 1 being low-lying locations have the highest value phosphatase enzyme is 0.34 mmol/g/hour. Observation of root colonization had a significant effect on the single factor giving FMA consortium but there was no interaction between location and treatment. Whereas observation of plant height, total dry weight of plants and root length gave no significant effect. A 10 g consortium FMA dosage provides the best results for all observed variables.

Analysis of variance, Castrol oil plant, FMA consortium

DO-03

Women and fuelwood: A study of the use of fuelwood as household energy in Cijedil and Wangunjaya Village, Cianjur, West Java, Indonesia

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Fuelwood, in some villages in rural areas, is the main energy source for households. Studies on the use of fuelwood are important because of the excessive use of fuelwood can impact on the environment. Although, the relationship between the use of fuelwood with forest that caused deforestation, for example, remains uncertain. The complex relationship between human, forest, agriculture, and the collection of fuelwood, need to state accurately that the excessive use of fuelwood can increase the pressure on the forest and other land use, such as agroforestry. Along with many people in many places in West Java, Indonesia, people of Cijedil and Wangunjaya of Cianjur, are use fuelwood as alternative household energy. The study shows that women play dominant role in the household, especially in fulfilling food needs. Fuelwood is used to cook food for family member meal. In the first phase of this study, we carried out a survey of 111 households in the village of Cijedil and Wangunjaya. The survey results also indicate that the use of fuelwood is high. Both as the only energy in the household or mix with other energy sources, such as gas.

Agroforestry, fuelwood, Cianjur, West Java, women

DO-04

Potential and conservation of kedawung (*Parkia timoriana*) in Meru Betiri National Park, East Java, Indonesia

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Kedawung (*Parkia timoriana* (DC.) Merr.) is one of type of rare medicinal plant because it is only found in a small part of Indonesia. Kedawung has high ecological and economic potential because it contains various active compounds such as anticancer. This study aims to analyze the condition of habitat vegetation, the rate of regeneration and distribution, as well as identifying the use of kedawung in the Meru Betiri National Park, East Java, Indonesia. The method used is vegetation analysis, observation, and in-depth interviews with the selection of informants using purposive sampling. Kedawung is most often found in research locations at tree and pole growth rates. At the growth rate of saplings and seedlings were not found at all this indicates that the regeneration of the Kedawung in the Meru Betiri National Park rehabilitation zone was unsuccessful and threatened its sustainability. Kedawung distribution is found in almost all rehabilitation zones of Meru Betiri National Park and is located at an altitude of 500 m asl. The highest value of importance value index was found in kedawung. The use of kedawung directly by the community is used as herbal medicine and the seeds are sold to the collectors as raw materials for the herbal medicine industry. Conservation efforts that can be done are by conducting regeneration to preserve the kedawung in Meru Betiri National Park.

Ethnobotany, regeneration, rare medicinal plants

DO-05

Impact of the green revolution program on cultivation practices and production system: A case study in Sindang Hamlet, Rancakalong Village, Sumedang District, West Java, Indonesia

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In the past, farmers of Sindang Hamlet, Rancakalong Village, Sumedang District, West Java, Indonesia practiced the wet-rice (sawah) farming system based on the Traditional Ecological Knowledge (TEK) and belief system. They coordinate their planting schedule according to indigenous calendar known as kalender tani or *pranata mangsa* (Javanese). The various inputs of the sawah farming system, namely rice seeds, organic fertilizers, and pesticides intensively used originate from the village, made little use of farm supplies obtained through purchased from outside (market). In the early 1970s, the Government of the Republic of Indonesia introduced the Green Revolution to increase the rice production of the wet-rice farming system. The five farming efforts (*panca usaha tani*) programs, namely the use of the High Yielding Rice Varieties (HYVs), the provision of inorganic chemical fertilizers, the use of synthetic pesticides, the development and improvement of irrigation, and the improvement of methods of rice planting methods intensively implemented.

About ten years later, in 1980s, the sawah farmers of Rancakalong Village, Sumedang District, West Java have adopted the Green Revolution program. As a result, the traditional the wet-rice cultivation practices of Rancakalong farmers that was originally based on the low-external inputs has dramatically changed to the high-external-input agriculture, depends on more commonly, artificial inputs, such as inorganic fertilizers, pesticides, fossil energy, and modern rice seeds, which originate from outside of the village and generally have to purchased. The aim of this study is to analyze changing cultivation practices of the wet-rice farming systems, and rice production systems. The study was undertaken in Sindang Hamlet, Rancakalong Village, Sumedang District, West Java. The method used in this study was mixed-method, combination of qualitative and quantitative, with some techniques, including observation, semi-structured interview, and structure interview was applied. The result of study showed that the farmers have stopped their traditional cyclical planting schedule based on kalender tani, the most local rice varieties have been replaced by the High Yielding Rice Varieties (HYVs), and farmers became dependent on external inputs, namely inorganic fertilizers, synthetic fertilizers, modern rice seeds, and fossil energy. Consequently, the HYVs have also more vulnerable to diseases and pests, such as brown plant-hopper (Nilarparvata lugens Stal), and also vulnerable to lack of waters due to drought of causing climate change. Accordingly, the model of agriculture systems that are based on ecologically sound, economically viable, and adaptable must be undertaken to develop sustainable agriculture.

Green Revolution, production system, sustainable agriculture, wet-rice farming system

DO-06

Wood species used in traditional Besemah house of Pelang Kenidai Village, Pagaralam City, South Sumatra, Indonesia

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The traditional house is one of the nature reserves that have the characteristics of various regions and must be protected and preserved. The purpose of the study was to explain the type of wood used in the construction of a traditional Besemah house in Pelang Kenidai Village, Dempo Tengah Subdistrict, Pagaralam City, South Sumatra, Indonesia. The method used in this research is a qualitative approach with a case study method. The types of wood used in preserving traditional houses are three types consisting of Mersawa (*Anisoptera* sp.), Surian (*Toona sureni* Merr.), and Rasamala (*Altingia excelsa* Noronha). The government is expected to support the preservation of traditional houses through policies on preserving traditional houses, rehabilitating forests and land, cultivating the types of wood used as raw materials for making traditional houses, providing alternative types of other wood as a substitute for these woods, developing culture-based tourism, and supporting to the community in preserving their culture.

Ghumah baghi, traditional house

DO-07

Beyond environmental education: Enabling factors and challenges in Labuhan Bajo Village, Sumbawa District, Indonesia

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Many works of literature in environmental education have raised the question "Can environmental education creates a significant change?" Young people in Labuhan Bajo Village, Utan Subdistrict, Sumbawa District, Indonesia proved that it is a slow process but yes it can. This research explored the enabling factors and the challenges for environmental education to have impacts beyond improved knowledge and awareness with the case study in Labuhan Bajo Village, Sumbawa District, Indonesia. Local youth group history, the enabling factors and the challenges for them were solicited through interviews with relevant stakeholders and observations. The local youth group named Kabete Education Center was established facilitated by a local NGO in Sumbawa District and legalized with the Head of the Village Decree in April 2015. They had a big vision to make the village as a place for education-tourism activities where they will couple education and tourism to promote marine ecosystem conservation. Yet, there is one problem to be tackled before embarking on a bigger purpose: the waste. As of 2019, their significant achievements include waste management at the village level where they were able to negotiate with the village office and the village house of representatives to allocate village funds for waste management. One of the local people devoted his fish pond for temporary landfill in the village. Agreement was also reached with the District Environment Agency to take the residual waste from the landfill in the village to the bigger landfill in the District Capital. The research revealed that the enabling factors are: (i) Outsider facilitation, (ii) Understanding assets (including pride and self-confidence), (iii) Networking, (iv) Availability of venue to channel their voice (i.e. through musrenbangdes), (v) Political motivation of the policymaker at the village level, and (vi) Village funds. While the challenges identified are (i) Commitment from the youth member, (ii) Commitment from the village office if the head of the village is replaced, (iii) Funds availability, (iv) Wider communities' awareness, (v)

Development plan related to the marine environment that they depend on.

Environmental education, village fund, waste management, youth-led

DP-01

Food contribution of livestock products in household consumption patterns in urban areas and rural areas of Flores Timur District, Indonesia

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Contribution of Food from livestock production is necessary for households to improve the nutritional consumption of family. This research was conducted in households involved in the Model of Region of Sustainable Food House (M-KRPL) in Flores Timur District, East Nusa Tenggara, Indonesia which consists of two farmer groups where each group represented urban and rural areas in 2013, the method used was survey method to obtain an indicator of quality of food consumption indicated by the score of Hope Dietary Pattern (PPH). The results showed that: (i) score of nutritional quality of the food (PPH) 74.49 for the urban area and 71.25 for rural areas. This indicates that the scores are still low when it compared with the maximum score which to be achieved is 100, this is because of the consumption patterns of community in Flores Timur District for urban and rural regions. The facts show that consumption of grains group still dominates rather than the animal food groups which contribute 12.71%, (ii) the average score of minimum level of animal energy for food group households amounted to 10.97 for urban areas and 7.23 for rural areas. This figure is still far the maximum figure which has to be reached that is equal to 24. (iii). The amount of the contribution of food from livestock products depending on several factors such as internal (individual) factors namely, income, preferences, beliefs (culture and religion), as well as knowledge of nutrition, as well as external factors such as factor agro-ecology, production, supply and distribution, diversity of food.

Consumption patterns, contribution, food from livestock production

DP-02

Optimize of vegetative conservation model to support poor farmers agricultural sustainable in Timor, Indonesia

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Timor Island of Indonesian area is 1.512.948 ha, which it's lived 1.794.450 peoples. Greater than 97% of this area is dominated by dry land agricultural and 70% of their topography greater than 25%, so it causes susceptible to land erosion. Although land conservation efforts in Timor have done by many stakeholders on late 20th century, but slash and burn cultivation practices still done. So, agricultural issue in Timor still relevant to discuss. Adaptive conservation model that sustained with Timor agroecosystem is vegetative conservation, it's for secure food and livestock food. Many research showed that erosion in Timor with existing conservation 100-300 ton ha-1yr-1, while tolerable soil lost only 12,5 ton-1ha-1yr-1. Optimize vegetative conservation model could be done through: (i) High differences between rows are suggested 0,5 m, so existing space rows 10,64 m will be shorter 2,63 m. This technique decrease soil erosion around 50%, (ii) Used hedge rows biomass as organic manure, (iii) Developed crop-livestock integration in farmers farming system, which hedgerows crop as cattle food supplier and cattle feces as manure, (iv) Making farmers accustomed use manure for their field, (v) Integrated tree legumes and grasses as hedgerow crops especially calliandra (*Calliandra calothyrsus*) and elephant grass (*Pennisetum purpureum*), (vi) Stop burning of crop biomass when preparing planted, but used for organic materials, and (vii) Developing of strip cropping maize and legumes crop.

Agricultural sustainable, dry land upland, Timor Island, Vegetative conservation

DP-03

Knowledge enhancement of field school participants and perception of shallot multiple production programs

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Shallot (*Allium ascalonicum* L. syn. *A. cepa* var *aggregatum*) is a horticultural commodity that has an important role in Indonesia's national economy. These commodity fluctuations in production are able to influence the inflation rates where a deficit on shallot supply makes the price of shallot at the high level. However, the sustainability of environment should be a consideration also in its production acceleration program. The Agency for Agricultural Research and Development has made various breakthroughs to increase the production of shallots, one of which is through Multiple Production Programs or Proliga which mainly use True Seed of Shallot (TSS). To spread this technology packaged, a dissemination method is needed, one is through the field

school (FS) for extension workers and potential shallot farmers. An evaluation needs to be carried out to assess the effectiveness of the dissemination program. The study aims to determine the increase in participants knowledge after attending the field school of shallot proliga and their perception to the technologies. Data collection was carried out in May 2019 in Dolo Subdistrict, Sigi District, Central Sulawesi. Data collection using a questionnaire taken twice, namely the initial test (pre-test) and the final test (post-test) after the field school activities. Data were analyzed using non-parametric Wilcoxon Match Pairs Test statistics. Farmer perception was analyzed using scoring method. The results of the analysis showed that the proliga field school activities significantly increased participants' knowledge with significance at 5% confidence level and the percentage of participants who increased their knowledge as much as 95.65%. Generally, farmers were interesting on packet of technology in Proliga but need a technology improvement on TSS to get easier applications.

Field, proliga school, shallot, True Seed of Shallot

DP-04

Traditional medicines used by Rancakalong Villagers, Sumedang District, West Java, Indonesia

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Rural communities in utilizing and managing their environment are not only intended to meet food needs, but are also often used to overcome health problems. Utilization of biodiversity by the community does not only focus on plants, but also some species of animals that are used for medicine or consumed to maintain health, especially in communities that still hold adat and are known to still consume traditional medicines such as in Rancakalong sub-district. The purpose of this paper is to establish the habits of the people of Rancakalong Village, Sumedang District, West Java, Indonesia in using traditional medicines to maintain and overcome their health problems. The research method was conducted interviews with several informants with ethnographic approaches. The results showed that there were 52 species of disease known to the people of Rancakalong Village, divided into 4 disease categories, namely mild, moderate, severe and very severe illness. To overcome and protect against disease, the community recognizes and uses 57 species of plants and 10 species of animals used as traditional medicine. The parts of plants that are most often used as medicine include leaves, stems, fruit, roots, and bark, while the animal parts used for medicine include meat, oil, skin and the entire body of the animal.

Disease, Rancakalong, rural communities, traditional medicine

Bioscience

EO-01

Gluten-free sorghum cake from modified sorghum flours: Sensory evaluation and nutritional characteristics

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The growing consumer demand for food with sensory quality and nutritional has called for research to develop new products with consumer acceptance as cake made sorghum flours, that can be inserted in diet of celiacs. Celiac disease characterized by an inappropriate immune response to dietary proteins found in wheat, rye, and barley (gluten and gliadin). Experimental gluten-free (GF) sorghum cake was formulated with 100% sorghum flours. Cake was prepared using modified sorghum flours with different fat type on the cake dough (butter and margarine). sensory and nutritional characteristics were evaluated. Both products were accepted on all attributes with acceptance from 70.9 to 93.2%. cake with butter had greater purchase intention than cake with margarine and better acceptability for flavor, aroma and overall acceptability. There was no difference in the texture and color acceptability between the two products. Chemical analyses indicated that both cake formulates may be potential sources of fiber (7.9-9.1 g/100g) and proteins (18.5 g/100g).

Gluten-free cake, modified sorghum flours, nutritional value, sensory, type fat

EO-02

Potentials of using chitosan nanoparticles as a carrier system for delivery of DNA vaccine candidate against Jembrana disease

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Jembrana disease is one of the obstacles in increasing the population of Bali cattle in Indonesia, so the development of a DNA vaccine candidate is needed to prevent the losses in Bali cattle. The prevention effort has introduced; DNA vaccine candidate developed by inserting the tat-gene JDV in the pEGFP-C1 vector and delivery using chitosan nanoparticle. This study aims to determine the expression of that gene JDV (pEGFP-C1-tat) using chitosan nanoparticle as a carrier system. pEGFP-C1-tat plasmid formulated with chitosan nanoparticles using coacervation complex method. Chitosan-pEGFP-tat complex transfected

into HeLa cell as an in vitro model of experiment and the expression of pEGFP-tat evaluated by confocal microscopy to see the fluorescence protein fusion of egfp-tat. Transfection results showed that chitosan nanoparticle promotes the internalization of plasmid into the nucleus and then expressed as an egfp-tat protein fusion with a green luminescence. From these results, chitosan nanoparticle potentially is developed as a carrier system in gene delivery.

Chitosan nanoparticle, HeLa cell, pEGFP-C1-tat

EO-03

The impact of social culture on tourism development at Sade Village, Lombok Tengah, West Nusa Tenggara, Indonesia

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Tourism development is crucial in Sade Village, Lombok Tengah, West Nusa Tenggara, Indonesia because it has an impact on socio-cultural changes in society. The development of globalized tourism has led to intensive communication with tourists. The research aims to uncover and describe the socio-cultural impacts of the Sasak tribe community at Sade Village. This research uses ethnographic research methods with participatory observation data collection techniques, interviews, documentation, field notes, and data analysis by using inductive. The results show that there were social and cultural impacts of the community. Before the existence of tourism development, the community only rely on agricultural sector and looking for job out of region. However, after tourism sector has developed, the community got opportunity to work in the tourism sector. The community has a new social organization that focuses on tourism activities such as tourism managers and tourism awareness group. There was a transformation in the language too. Previously, the local community only use the Sasak language to communicate. After the existence of tourism, people who work in the tourism sector must be able to master a variety of foreign languages and changes to the family structure.

Development impacts, sociocultural, sustainable, tourism

EO-04

Optimizing noni (*Morinda citrifolia*) in reducing detrimental impact of bulk cooking oil

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Cooking oil is one of the most processed palm oil products that are needed in the household. However, the highest consumption of cooking oil comes from bulk cooking oil which is not good for health. Bulk cooking oil is easily oxidized and produces free radicals. The purpose of this study was to determine the effect of adding noni (*Morinda citrifolia* L.) fruit extracts dissolved with four different types of solvents. This research took place at the Plant Physiology Laboratory, State University of Jakarta, Indonesia which took place from March to April 2019. The research design was in the form of a Randomized Completion Design (CRD) with one treatment factor. Noni extract is made by soaking the noni simplicia in 4 solvents (ethyl acetate, ethanol 96%, n-hexane, and 70% ethanol) for 12 hours. Noni extract is then mixed with bulk oil for 12 hours. The parameters observed were vitamin content in oil, flavonoid content, and the effect of noni fruit extract on the content of free fatty acids (FFA) and peroxide value. Data analysis of flavonoid content was performed using one-way ANOVA and continued with DMRT test at 5% level. The results showed that bulk oil contained vitamins A and D. The highest flavonoid content was found in extracts using 70% ethanol solvent (81.95±0.95 mg QE/mg). The lowest FFA (0.56%) and peroxide value (2.20 mek O2/kg) are found in the oil mixed with noni extract that is dissolved with n-hexane solvent.

Bulk cooking oil, free fatty acids, peroxide value, solvent

EO-05

Mathematical methods in conservation biology

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Quantitative methods are increasingly gaining popularity to use in life sciences. This includes mathematical and statistical tools and computational approaches. Historically some concepts in conservation biology have already a firmly close connection with some mathematical concepts. In this paper, we review some mathematical methods applying to solve problems in conservation biology. The review will be done by collecting scattered work form various journals and review systematically by categorizing the most dominant concepts used in this field. The concepts will be briefly elaborate and the use of how they are related to the approach in obtaining the solutions of some conservation biology. Beside proven mathematical methods

as described above, some potential mathematical methods will also be discussed.

Discrete and continuous dynamical systems, quantitative methods, mathematical model, statistical methods

EO-06

In vitro evaluation of bacteriocin of *Lactobacillus plantarum* BP102 combined with *Asam sunti* extract against Multidrug-Resistant *Escherichia coli* from lettuce

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In this study, the effect of bacteriocin of *Lactobacillus plantarum* BP102 combined with *asam sunti* (fermented blimbi) extract towards MDR *Escherichia coli* from lettuce was evaluated in vitro. Bacteriocin producers were screened from endophytic lactic acid bacteria isolated from medicinal plants, and the potential bacteriocin producer was further identified based on 16S rRNA gene sequencing. Antagonistic activities of bacteriocin and *asam sunti* extract against five MDR *E. coli* strains were assayed using agar disk diffusion. These antibacterial agents were also tested in washing treatment of lettuce contaminated artificially with MDR *E. coli*. Endophytic *Lactobacillus plantarum* BP102 was the potential bacteriocin producer. Bacteriocin and *asam sunti* extract can inhibit the growth of all MDR *E. coli* strains (clear zone diameter: 2.3-6.3 mm). Antagonistic activities of combination between bacteriocin and *asam sunti* extract were lower than of *asam sunti* extract (3.3-4.3 mm). Antibacterial activity of *asam sunti* extract might be due to either acidity or active compounds. Washing treatment of bacteriocin combined with *asam sunti* extract was significantly inhibited the MDR *E. coli* LL1.2 compared to each antibacterial tested separately. *Asam sunti* extract or in combination with bacteriocin could serve as potential washing treatment to eliminate MDR *E. coli* in ready to eat vegetables.

asam sunti, bacteriocin, *Escherichia coli*, fermented blimbi, hurdle technology, multidrug-resistant

EO-07

Estimation of inbreeding rate of Pitalah duck as germplasm at West Sumatra Province, Indonesia

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The Pitalah ducks was a local duck in West Sumatra Province, Indonesia and were decided by the Indonesian Ministry of Agriculture as Indonesian poultry genetic resources in 2011. A survey was carried out at Nagari Batipuah Baruah in Tanah Datar District, West Sumatra Province, Indonesia to estimate inbreeding rate on Pitalah ducks. To prevent inbreeding depression while estimation of inbreeding rate of local duck was very important. This research was aimed to calculate flock composition, effective population size (Ne) and inbreeding rate (ΔF) of Pitalah duck under in-situ population. The census was the main research method. The results showed that number of breeding males (Nm) was 675 heads and females (Nf) were 2,445 heads. Male and female ratio (Nm/Nf) was 27,61%. Effective population size (Ne) was 2,115 heads. The rate of inbreeding (ΔF) calculated for the indigenous Pitalah duck flock considering the existing flock size was 0,24% indicating that the population is not at the risk of extinction. It is concluded that inbreeding depression in Pitalah duck population did not occur.

effective population size, inbreeding rate, Pitalah duck, West Sumatra

EO-08

Physical quality and crude protein content of cocoa shell silage from different clones as animal feed

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The research aims to find out how the physical quality and the crude protein content of cocoa shell silage from different clones. Cocoa shells used are from six clones namely Sulawesi1 (S1), Sulawesi2 (S2), Local01 (L01), local02 (L02), local padana (LP) clones and mixture of all clones (S1 + S2 + L01 + L02 + LP). The study used a completely randomized design (CRD) with treatment P1: 70% S1 + 30% rice bran; P2: 70% S2 + 30% rice bran; P3: 70% LP + 30% rice bran; P4: 70% L01 + 30% rice bran; P5: 70% L02 + 30% rice bran; and P6: 70% S1 + S2 + L01 + L02 + LP. Data analysis using ANOVA test, if there are differences between treatments followed by Duncan Test. The results showed that silage had good physical qualities with a distinctive sour aroma of fermentation, the color did not differ greatly from the original color of the cocoa shell from each clone. There were significant differences in crude protein content between treatments P6 (2.0%) and P2 (5.0%), P3 (5.33%), P5 (5.67%), P1 (6.33) and P4 (9.67%), but not significantly different between clone. The highest crude protein content was in P6 (6.02%) and the lowest in local clones02 (4.80%).

Clones, cocoa, crude protein, silage

EO-09

Morphological characters of brown seeded lines of soybean under shading condition

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The objective of the study was to know the response of morphological characters of some brown seeded lines of soybean (*Glycine max* (L.) Merill) under shading condition. This study was conducted using exprimental method with plastic pots as experimental units. The experimental units were laid out using Split Plot Design. The main plot was shading factor (N) consists of: N0 = without shading stress (normal condition); N1 = shading condition (65% ligh intercept of black paranet shade). Subplot was brown seeded soybean consist of 6 lines, namely: G1 = KH7B; G2 = KH7C; G3 = KH7D; G4 = KH9; G5 = KH14; G6 = KH50B. Every subplot was in four replicates. Based on the results of the study, it could be concluded that: (i) plant height, harvesting date, and number of productive branches were significantly affected by brown seeded lines of soybean x shading condition interaction, (ii) shading stress significantly increased the plant height and trifoliate leaf wide and decreased number of trifoliate leaf, number of productive leaf, number of filled pods, number of seed per plant, and seed weight per plant, (iii) number of trifoliate leaf, flowering date, number of filled pod, and number of seed per pod varied significantly among brown seeded lines of soybean.

Brown seeded soybean, lines, morphological traits, shade stress

EO-10

The performance of growth of several robusta coffee varieties in nursery

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Increased production of coffee plants, among others, is influenced by the availability of superior seeds. Information on plant superiority can be known based on the performance growth of the plant. This study aims to determine the performance of growth of cuttings of five coffee clones in the nursery. The study was carried out at the Tegineneng Experimental Garden-South Lampung, starting from May to August 2018. The method used was a demonstration plot with a randomized block design with five replications. The five new superior varieties of Robusta coffee studied were: SA 237, BP 436, BP 939, BP 936, and BP 308. Data were analyzed by variance and followed by the middle test using Tukey/BNJ at the level of 5%. The results of the study show that the performance of the application of new superior varieties in the activity of providing quality seeds, namely by implementing cuttings nursery, five new improved varieties, on average there is diversity, especially for the growth of plant height.

New superior varieties, nursery, performance, robusta coffee

EO-11

Molecular characterization of Riau's mascot flora (*Oncosperma tigillarium*)

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This research was aims to find out about the molecular characterization of the Nibung plant (*Oncosperma tigillarium*). It has been conducted in the Biology Laboratory of Universitas Riau, Pekanbaru, Indonesia. The results of DNA isolation were tested to determine the quality of DNA that has been isolated. DNA purity was determined based on A260/A280 comparison values were tested using a nanodrop spectrophotometer method. The quality of DNA from isolation was influenced by several factors such as the condition of the leaf sample used, the length of time of grinding, the phenolic content of the sample, the process of taking the supernatant solution and others. In this study, these factors were seen to significantly affect the quality of the DNA isolated. Also, DNA fragments generated from the isolation process are large, which indicates the large concentration of DNA produced. Although many DNA bands smear they still have clear DNA bands.

Molecular characterization, *Oncosperma tigillarium*

EO-12

Utilization of sugarcane waste (Bagasse) as bokashi fertilizer with variation of local microorganism activators

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Sugarcane bagasse is waste from grinding sugarcane after the extraction of sap. Sugarcane bagasse contains nutrients that have the potential to be used as organic fertilizer. This study uses an experimental method that aims to produce bokashi fertilizer from sugarcane bagasse waste processing with variations of EM-4 activators, papaya MOL, banana weevil MOL, and cow dung MOL. Bokashi fertilizer which is sugarcane bagasse waste is made with 6 kinds of

combinations (P0-P5). The bokashi parameters measured included, qualitative parameters (color, odor, and texture) and quantitative parameters (temperature, water content, pH, and nutrient content of carbon, nitrogen, phosphor, and potassium). The measurement data of the bokashi parameters were analyzed descriptively, then compared with the compost quality standard according to SNI 19-3070 of 2004. The results showed that Bokashi fertilizer was produced within 21 days, with nutrient content that had complied with compost quality standards according to SNI 19-3070 of 2004. Overall, sugarcane bagasse bokashi fertilizer contained higher nitrogen nutrients than phosphorus and potassium. The best combination is considered by P5, with its characteristic black-brown color, changing as soil, loose fading, 37°C temperature, 50% moisture content, pH 6.5, Carbon nutrient content (49.36%), Nitrogen (1.01%), Phosphorus (0.33%), and Potassium (0.34%).

Bokashi, compost, bagasse, EM-4, MOL

EO-13

Growth and yield of red onion (*Allium ascalonicum* L. var. tuktuk) from true shallot seed and bulbs treated with liquid fertilizer

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The study aimed was to know the distinction of the multiplication of plants from the true shallot seeds and tubers of tuk-tuk variety of shallots, and to determine the effect of the application of liquid organic fertilizer and rhizobacteria. The study used a one-factor randomized block design. The research was conducted from April to July 2019 in Bungkulan Village, Sawan Subdistrict, Buleleng District, Bali, Indonesia at an altitude of±10 meters above sea level. The results showed that the growth and yield of shallots that were propagated with tubers were better than the origin of the seeds. There is no significant difference between liquid organic fertilizer and rhizobacteria.

Liquid organic fertilizer, rhizobacteria, seeds, tuber, true shallot

EO-14

Anthocyanin content in some black rice cultivars

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Rice is one source of staple foods that have high health benefits, especially black rice, because of the presence of anthocyanin, carbohydrates, fats, proteins, fiber, and minerals. At present, people are starting to pay attention to nutritious foods with the contents and benefits that support health for their diet patterns. This greatly provides a great opportunity for the development of black rice as one of the cultivars which have high anthocyanin content. Anthocyanin is one of the phenolic compounds that enter flavonoid compounds and function as an antioxidant that has a role for the plant itself and for humans as black rice consumers. Anthocyanin in black rice is the black pigment found in pericarps and tegmen (skin layers) of rice. Some are also found in all layers of rice. This research aimed to determine the anthocyanin content in some black rice cultivars. The analysis used to determine the anthocyanin content is the pH difference method. The results of the experiment showed that from 10 cultivars tested, the highest anthocyanin content was found in Toraja black rice cultivars of 21.12 mb/g, followed by Banjarnegara of 19.3 mg/g and melik black rice of 19.06 mg/g. The results of this research are essential for a breeder for the initial selection of the development of superior black rice varieties to choose the rice plant parent with high anthocyanin content.

Anthocyanin, black rice

EO-15

Detection of Gram-positive (*Listeria monocytogenes*) and Gram-negative (*Salmonella typhimurium*) bacteria by boiling and direct PCR using qRT-PCR

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Comparison of DNA extraction by boiling and direct PCR amplification methods was done on Gram-positive (*Listeria monocytogenes*) and negative (*Salmonella typhimurium*) bacteria. The aim of the research is giving additional information about bacteria detection by using real-time PCR. We used real-time PCR SYBR Green for DNA amplification. The results then were analyzed qualitatively by comparing Ct value and Tm produced by the aforementioned methods. The Ct values of *L. monocytogenes* which were analyzed by using boiling method was between 9.93 and 11. In addition, we got Ct value of the bacteria which was analyzed by using direct PCR was between 8.50 and 9.64. On the other hand, Ct

value of *S. typhimurium* by using boiling method was between 14.14 and 15.20. Moreover, Ct value by using direct PCR was between 7.55 and 8.91. Interestingly, we got Tm of *L. monocytogenes* by using boiling method was between 80 and 81.20. Meanwhile, Tm by using direct PCR was between 81.30 and 82.00. However, Tm of *S. typhimurium* by using boiling method was between 85.70 and 86.50. What is more, Tm we got by using direct PCR was between 85.30 and 86. In conclusion, based on the results we analyzed by using statistical methods, the results of those methods were statistically not different.

Direct PCR, isolation boiling, *Listeria monocytogenes*, *Salmonella typhimurium*

EP-01

Clove oil coating formula to suppress colonization of *Aspergillus flavus* on nutmeg seeds

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The aflatoxin content in exported nutmegs has become an international issue, especially in the European markets. This research aims to find out the effectiveness of the coating clove oil formula to suppress the growth of *Aspergillus flavus*. The in-vitro assay of clove oil, Curcuma oil, coconut shelled vinegar, and benomyl was carried out on the potato dextrose medium (PDA). The clove oil (10%) was formulated using a mixture of carriers (MgO, CaO, and $CuSO_4$). The unshelled nutmeg seeds were first dipped in gelatin solution, air-dried, and coated with the clove oil formula, sprayed with a suspension of *A. flavus* conidia, then incubated in humid plastic boxes. The colonization of *A. flavus* on the surface of nutmeg seeds was recorded and the shelled was broken. Small pieces of the shelled were placed on the PDA medium to test the presence of *A. flavus*. The water content of the shelled nutmeg was assayed. The study showed that clove essential oil suppressed the growth of *A. flavus*. The infection rate of *A. flavus* on the clove oil formula coated was low (33%) compared to the untreated (100%). The water contents of the shelled from the coated and uncoated were 9.90% and 9.18%, respectively. The pre-coated with gelatin solution enhanced coating quality on the nutmeg surface seeds. The amount of clove oil powder formula was estimated as much as 2,8 kg for 1000 unshelled nutmeg (± 11.75 kg). Clove oil coating formula can be developed to minimize the contamination of *A. flavus* on unshelled nutmeg seeds.

Powder coating formula, unshelled nutmeg

EP-02

Isolation and characterization antagonist bacteria isolated from *Myristica fragrans* against White Rots Fungi

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The objective of this study was to isolate and characterize antagonist bacteria isolated from nutmeg (*Myristica fragrans*) against White Rot Fungi. Samples were plated and colonies were isolated for screening their potency to inhibit White Rot Fungi. Isolation of phyllospheric bacteria from nutmeg produced 23 isolates with different morphological characters. Chitinase test on 23 isolates produced 8 isolates of phyllospheric bacteria which gave positive results, showing that there was potential for chitinase production from the 8 isolates with different chitinolytic indexes. Antagonist test on white root fungus produced 9 isolates that were positive antagonists to white root fungus, showing that 9 isolates were able to inhibit the growth of the fungus which causes white root disease which commonly attacks rubber plants. Each isolate has a different inhibition, characterized by a comparison of the size of the diameter of the fungus that can grow with the diameter of the control. Based on the calculation of bacterial inhibition of fungal growth, P. K2 isolates gave the best results, which amounted to 50%, also indicated by the smallest diameter of the fungus, the results of antagonistic tests also showed the formation of inhibitory zones on PDA media. The molecular identification showed that PK.2 isolate was classified as Bacillus subtillis with 99.43% homology. These findings provide information about the species that may be expected in controlling white-rot fungi on *Myristica fragrans*.

Isolation, *Myristica fragrans*, White Rot Fungi, chitinase

EP-03

Matriconditioning techniques and biological fertilizer applications to improve quality and soybean seed production

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Soybeans are an important food ingredient for the people of Indonesia, while national production is not sufficient so that it is still imported. Efforts to increase production continue to be carried out with the aim of achieving self-sufficiency in 2020. One of these efforts is by providing quality seeds to support the Jabalim function. One limiting factor in soybean production in the tropics is the rapid decline of seeds during storage. Efforts to improve the quality of seeds that have been retreated can be done with the invigoration technique, among others, is the matrix-conditioning technique (conditioning the seeds using moist

solid media). The matrixing technique can also be integrated with other seed treatment applications such as rhizobium inoculation. The research was carried out in Ngawi, East Java, Indonesia using 3 replicate separate plot designs. Subplots are matriconditioning treatment, which consists of (i) Without matriconditioning and without biological fertilizers, (ii) Matriconditioning, (iii) Biological fertilizers Iletrisoy, (iv) Biological fertilizers Iletrisoy + solvents P, (v) Matriconditioning + Iletrisoy + P. solvents. Each treatment was planted in a trial plot measuring 4 m x 5 m, two plants per hole. The seeding matrix uses moist charcoal powder with a ratio of 9 seeds: 6 charcoal powders: 7 water for 12 hours, either alone or in conjunction with rhizobium biofertilizer (Iletrisoy plus) can increase seed vigor in the field so that stover dry weight, number of pods content and yield dried seeds of soybean plants increase. The matrix treatment did not reduce the infectivity and efficiency of rhizobium biofertilizers. Genetically grown varieties of Grobogan have the highest leaf chlorophyll index, followed by Tanggamus and Wilis.

Biological fertilizer, matriconditioning, seed, soybean

EP-04

Study of shallot cultivation technology during the rainy season using polybags in Jakarta, Indonesia

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Shallot (*Allium ascalonicum* L.), until now still occupies an important position to be developed as a strategic commodity in Indonesia. Shallots have a high enough economic value and at a certain time are able to shake up inflation in Indonesia. This is caused by the influence of weather conditions when conducted onion cultivation. Shallot cultivation in the rainy season can affect the results of its products so that the selling value also fluctuates. Therefore we need research on shallot cultivation technology during the rainy season using hoods. The study was conducted at BPTP Jakarta, starting in November 2018 until February 2019. The research design used was the Split plot design with 2 factors and 4 replications. The first factor, as the main plot, is the use of hoods and without hoods. The second factor as subplots is the use of Mentes, Bima and Trident varieties. The results showed that the treatment without using a plastic hood had the best effect on plant height parameters. Number of tubers/plants with an average of 9.33 tubers. Wet weight/plant with an average of 41.31 g. Tuber diameter/plant with an average of 18.85 mm and dry weight/plant with an average of 33.97 g. Bima variety gives the best effect on plant height. Wet weight/plant with an average of 31.59. Tuber/plant diameter with an average of 18.54 mm. Dry weights/plants with an average of 26.59 g.

Plastic hood, polybag, rainy season, shallots, varieties