INTERNATIONAL CONFERENCE ON BIODIVERSITY

Society for Indonesian Biodiversity
Mulawarman University & Sebelas Maret University
Balikpapan, Indonesia, January 14-16, 2016

Certificate of Appreciation

Awarded with thanks to:

Widi Sunaryo, Dr.

In recognition of his/her significant contribution as:

Presenter

of

International Conference on Biodiversity

Balikpapan, 14-16th January 2016

Prof. Dr. Sutarno, M.Sc., Ph.D.
CHAIRPERSON

SOCIETY FOR INDONESIAN BIODIVERSITY
MASYARAKAT KEANEKARAGAMAN HAYATI INDONESIA

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ABSTRACT

INTERNATIONAL CONFERENCE ON BIODIVERSITY

SOCIETY FOR INDONESIAN BIODIVERSITY

Balikpapan, 14-16 January 2016

Greenpeace action in Kalimantan, December 3, 2015; photo by Ulet Ifansasti

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ABSTRACT

INTERNATIONAL CONFERENCE ON BIODIVERSITY

SOCIETY FOR INDONESIAN BIODIVERSITY

Balikpapan, 14-16 January 2016

THEME:

Heart of Borneo: the Conservation, Research and Sustainable use of Biological Diversity in Borneo

SECRETARIAT ADDRESS

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TIME SCHEDULE

International Conference on Biodiversity

Society for Indonesian Biodiversity (SIB)

Balikpapan, Indonesia, 14-16 January 2016

TIME	ACTIVITIES	PERSON IN CHARGE	SITE
January 14, 2016			
08.00-09.00	**Registration**	Committee	Lobby
09.00-09.15	**Speech of the Committee**	Chairman of the committee	R0
09.15-09.30	**Speech of the International Office**	Head of International Office of the Mulawarman University	R0
09.30-09.45	**Opening speech**	Rector of the Mulawarman University	R0
09.45-10.00	**Photo Session and Coffee Break**	Committee	R0, Lobby
10.00-12.00	**Panel 1** Prof. Dr. Wolfgang Nellen Dr. Jatna Supriatna	Moderator	R0
12.00-13.00	**Rest, prayer, lunch**	Committee	Lobby
13.00-15.00	**Parallel presentation I**		
	Group 1: AO-01 to AO-08	Moderator	R0
	Group 2: AO-09 to AO-14, AP-01, BO-01	Moderator	R1
	Group 3: BO-02 to BO-09	Moderator	R2
	Group 4: BO-10 to BO-17	Moderator	R3
	Group 5: BO-18 to BO-25	Moderator	R4
15.00-15.15	**Coffee Break**	Moderator	Lobby
15.15-17.15	**Parallel presentation II**		
	Group 6: BO-26 to BO-32, BP-01	Moderator	R0
	Group 7: BP-02 to BP-08, CO-01	Moderator	R1
	Group 8: CO-02 to CO-08	Moderator	R2
	Group 9: CO-09 to CO-15	Moderator	R3
	Group 10: CO-16 to CO-22	Moderator	R4

January 15, 2016

08.00-09.00	**Coffee break**	Committee	Lobby
09.00-12.00	**Panel 2**	Moderator	R0
	Dr. Mark Rayment		
	Dr. Cambell O. Webb		
	Prof. Dr. Enos Tangke Arung		
12.00-13.00	**Rest, prayer, lunch**	Committee	Lobby
13.00-15.00	**Parallel Presentation III**		
	Group 11: CO-23 to CO-29	Moderator	R0
	Group 12: CP-30, DO-01 to DO-06	Moderator	R1
	Group 13: DO-07 to DP-02	Moderator	R2
	Group 14: DP-03, EO-01 to EO-06	Moderator	R3
	Group 15: EO-07 to EO-13	Moderator	R4
15.00-15.15	**Coffee Break**	Committee	Lobby
15.15-17.15	Group 16: EO-14 to EO-20	Moderator	R0
	Group 17: EO-21 to EO-27	Moderator	R1
	Group 18: EO-28 to EO-34	Moderator	R2
	Group 19: EO-35 to EO-39, EP-01, EP-02	Moderator	R3
	Group 20: EP-03 to EP-09	Moderator	R4
17.15-17.30	**Closing speech and other explanations**	Chairman of the committee	R0

January 16, 2016

08.00-09.00	**Trip to Bukit Bangkirai, Samboja**	Committee	-
09.00-12.00	**Natural tourism at Bukit Bangkirai (canopy trail)**	Committee	-
12.00-13.00	**Rest, prayer, lunch**	Committee	-
13.00-14.30	**Shopping time**	Committee	-
13.00-15.00	**Back to Sepinggan Airport, Balikpapan**	Committee	-
15.00	**Sepinggan Airport, Balikpapan**	Committee	-

Upcoming event: International Conference on Biodiversity, Yogyakarta, Indonesia, 18-19 March 2016

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ABSTRACT
International Conference on Biodiversity
Society for Indonesian Biodiversity (SIB)
Balikpapan, Indonesia, 14-16 January 2016

Genetics diversity

AO-01

Genetical diversity study of Stomatopoda (mantis shrimp) in Tangerang shallow water, Banten

Abinawanto, Eko Burhanuddin♥, Jatna Supriatna, Wisnu Wardhana

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The research was conducted to know Stomatopoda genetic diversity in Tangerang coastal area for periode of January-Desember 2015. The larva of Stomatopoda was sampled 3 times in February, June and September on 4 sampling stations betwen Tanjung Kait headlands and the estuary of Cisadane river. Morphometric measured at UI Olympus Bioimaging Center using Olympus SZX16 research stereo microscope, lens SDFPLAPO PF 1X and SDFPLAPO PF 2X optical zoom 0.7x-11.5x, camera Olympus DP73 with C mount adapter 0,5x, Software CellSens Dimension V1.11. Molecular identification perfomed in Genetica Laboratory, Biology Department FMIPA UI Depok, West Java while sequencing using the service from Korean Macrogen. Twenty four larvae were found during the research. Only 12 from all larvae have been successfully amplified for the sequence of Cytochrome Oxidase sub unit 1 (CO1).. All amplified CO1 gene were sent to macrogen for sequencing procedure. The result shown 4 group closely related to species *Oratosquilla interrupta, Harpiosquilla harpax, Stomatopoda* sp. 1 BTN-2013 sekuens from Mulyono et al. (2013), and *Oratosquilla oratoria* with identities 85% (NCBI 2015). The distribution of stomatopods in Tangerang coastal area tend to getting far from the estuary which are stasiun 1 and 3 showed the larger amount of individu.

Stomatopoda, mantis shrimp, genetical diversity

AO-02

Genetic diversity, population structure and aquaculture of short-fin eel *Anguilla bicolor* McClelland, 1844 in Indonesia

Melta Rini Fahmi

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The short-finned eel *Anguilla bicolor* is known to be subdivided in two distinct subspecies (i.e. *A. bicolor* bicolor and *A. bicolor* pacifica), each subspecies being geographically distributed in allopatry, beside as central of economic position. This study was conducted to determine the genetic diversity, population structure and the growth of *A. bicolor* farming in Indonesia. A total 180 specimen of *A. bicolor* were collected around Indonesian water. The genetic diversity was estimated by using the unbiased haplotype and the nucleotide diversity of 16SrRNA sequence, the population structure was calculated by observed heterozygosity (Ho) and estimated heterozygosity (He) for microsatellite locus and evaluation of *A. bicolor* farming was conducted by interviews with fishermen and collector of glass eel. The results showed *A. bicolor* has a high heterozygosity ($0.767 < He < 0.891$). The analysis of 16SrRNA sequence diversity showing haplotype and nucleotide diversities of 0.98 and 4.57%, respectively. Both the mitochondrial and the microsatellite markers confirm the subdivision into two subspecies while microsatellite loci suggest a moderate differentiation between subspecies. Indonesian government have issued the regulation for prohibits export of glass eel. The objective of this regulation are for conserving the eels resources in Indonesian water and to ensure the availability of eel seed resources and increasing the activity of eel culture in Indonesia. Since that the eel aquaculture was begun to develop in some area in Indonesia especially western part of Java. Since that the eel aquaculture was began to develop in some area in Indonesia especially western part of Java and the species which developed generally is *A. bicolor*. Basically the cultivation of *A. bicolor* in Indonesia

was divided into two category namely industrial scale and small scale. This industri was supported by the availability of glass eel that captured on south coast of Java such as Pelabuhan Ratu, Pangandaran, Cilacap and Yogyakarta.

Shortfin eel, *Anguilla bicolor*, Aquaculture, Indonesia waters

AO-03

Genetic diversity of Kalimantan swamp buffalo (*Bubalus bubalis*): Inferences on phenotypic and characteristics the region of domestication

Surya Nur Rahmatullah

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Data from several published studies genetic diversity of swamp buffalo (*Bubalus bubalis*) region on South Kalimantan and East Kalimantan were combained so as to gain a broader understanding of phenotypic variation and characteristics relationship among the population and demographic history of domestication. Mean numbers of phenotypic and characteristation heterozygosities were significantly different among population. Differentiation among population in South Kalimantan region was much less than among the East Kalimantan. In the South Kalimantan wild animals, phenotypically swamp type but characterization are significantly different in East Kalimantan. Relationship among swamp populations show the Kalimantan population of buffalo separated into two groups and two called name, in the South Kalimantan, called "*swamp buffalo*", and in the East Kalimantan, called "*kalang buffalo*". Given these relationships and the patterns of phenotypic and characteristics variability, making postulate that the swamp buffalo was domesticated in the two regions, South Kalimantan and East Kalimantan. Following domestication, it spread two districts in two provinces, in South Kalimantan through in Hulu Sungai Utara (HSU), in East Kalimantan through in Kutai Kartanegara.

Characteristics, domestication, Kalimantan, swamp buffalo, phenotypic

AO-04

Phenotypic variation in male local chicken at District of Tapin, South Kalimantan

Surya Nur Rahmatullah[1,♥], Lisa Wardah[2], Abrani Sulaiman[3]

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[2] Assesment and Development Institute for Integrated Agriculture (ADI2A),Tambang Ulang, South Kalimantan, Indonesia
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This aims of the research was to study the phenotype characteristic of male local chicken (*Gallus domesticus*) using significant, correlation and regression analysis in District of Tapin, South Kalimantan. Research was conducted in the District of Tapin, using 120 male local chickens. Observed variables, namely the tibia length, body length and body weight. Data were analyzed using MINITAB program. The results showed the analysis results of correlation with body weight, body length and tibia length. Regression was most influence on body weight that the age of 8 month of B =-707 + 108 body length. Correlation of body weight and body size range male local chicken at the age of 5-8 month with Significant ($P<0.05$) is very strong values contained in the body length of the age of 8 month 0.986; Determination (R2) = 97.2%; regression B =-707 + 108 Tibia length. This correlation can be used as a reference for the selection of local chicken in Tapin.

Correlation, male local chicken, phenotypic variation, significant analysis

AO-05

Phalangeridae species identification based on 16S rRNA gene sequences

Elizabeth Novi Kusumaningrum

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Kuskus (*Phalanger* sp.) is endemic in eastern Indonesia (Sulawesi, Ambon and Papua). Based on IUCN category least concern species, and CITES, the conservation status of the animal including Appendix II category. It is necessary for the conservation of one of them through genetic conservation. The use of 16S rRNA gene sequences in mitochondrial DNA (mtDNA) as a genetic marker for these markers is often used to study the genetic diversity and kinship of various sub-species. The aim of research was to identify the level of groups Palangerinae using 16s rRNA markers, in addition also to analyze phylogenetic palengerinae individuals in the group. Molecular-based research methods using primers 16S and 16S rRNAF rRNAR (PCR product of 950bp). Research results obtained through the process of sequencing the amplicon of 928 bp, then analyzed using the program MEGA version 6.0 with comparative data using data from Genebank. Phylogeny reconstruction using the Neighbor-Joining (NJ) with bootstrap 1000x research indicates that the objects are species *Phalanger vestitus* and *Spilocuscus maculatus*. Results of the analysis of genetic diversity based on genetic markers gen16s rRNA in *P. vestitus* and *S. maculatus* detected 34 nucleotide sites that can be used as a barcode between the two genera. In conclusion, the group identified

Phalanger objects being studied are *P. vestitus* and *S. maculatus* and 16s rRNA genetic markers can be used to distinguish between individuals in a group Phalangerinae

16s rRNA, genetic conservation, *Phalanger vestitus, Spilocuscus maculatus*

AO-06

Analysis proportion out-crossing and self-crossing ebony (*Diospyros celebica*) provenance Lasitae Barru, South Sulawesi

Andi Hardianti, Joni Ringgi Allo, Iksan lahusen, Selvina, Jihan Nanda

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Ebony or ebony wood (*Diospyros celebica*) is economically valuable and increasingly scarce in their habitat. Besides endangered, ebony has experienced inbreeding depression (ID) or impairment of characters with their selfcrossing resulted in the incorporation of the same gene so that genotype produced more homozygot. ID may result in the look of wood and the strength decreases. The purpose of this study was to determine and analyze the proportion of outcrossing and selfcrossing that occurs in stands of ebony in Lasitae, Kabupaten Barru, South Sulawesi. The method of sampling in the field was seleted sample of 32 randomly selected female parent as much as 3 individual trees. Trees that are around the tree serve as a potential female parent male parent or used as pollen donors. Progeny seed ebony and ebony leaves were used for DNA isolation. Pollination pollen analysis using markers Simple Sequence Repeats (SSR), this method can determine the marriage on the plant. Molecular analysis using analysis parentage software Cervus 2.0 computer program. The results showed Provenance Lasitae dominant outcrossing, since the percentage of outcrossing is higher than selfcrossing and a maximum of 5 times pollination by the male elders. Molecular analysis using SSR markers showed four SSR markers tested are capable of producing polymorphic alleles tape which is highest at the locus 1430 (DC588341).

Ebony, outcrossing, selfcrossing, SSR

AO-07

Redefining dispersal boundaries of Siganus fuscescens in the Coral Triangle Area

Ni Putu Dian Pertiwi[1,♥], Chloe Henderson[2], Nur Ismu Hidayat[1], Paul H. Barber[3]

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The increasing demand of fish in Coral Triangle Area has lead to overexploitation of some species of fishes. One of the commercial fish which also known to be the source of food and income for local community is Mottled Spinefoot (*Siganus fuscescens*). Population study on this species is important in order to manage sustainable stock populations. Genetic variation of the mitochondrial DNA was analyzed to examine the population structure of Siganus fuscescens in Indonesia as part of the Coral Triangle Area. In total, 789 basepairs of control region mtDNA sequences were determined from 133 specimens collected from six localities, including Seribu Islands (n=27), Karimunjawa (n=19), Komodo (n=39), Selayar (n=20), Lembeh (n=19) and Luwuk (n=9). From the data, 26 variable sites and 24 haplotypes were detected, with most of the haplotypes are unique to each location. Haplotype data showed that one haplotype are shared among all, 3 haplotype are shared between two populations (Komodo & Selayar; Lembeh & Seribu) while 20 private to a single deme (local population). Haplotype diversity (h=0.444) and nucleotide diversity (π=0.00165) indicated low diversity. Despite the low diversity value, ΦST value (0.0658) of AMOVA analysis revealed genetic structure in *S. fuscescens* population in Indonesia, with the indication of recent gene expansion and that gene flow is still happened between each of the populations.

Genetic variation, Indonesia, Siganus fuscescens

AO-08

A genotype-dependent effects of cold pre-treatment duration and putrescine enriched medium to the anther culturability of local upland rice varieties from East Kalimantan

Nurhasanah♥, Ananda Nuryadi Pratama, Widi Sunaryo

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Anther culture has been evaluated as an effective method for homozygous plants production which is very important for hybrid breeding program. Low number of green plantlets is a main obstacle in the application of this technique. Culture conditions increasing anther culture efficiency can be applied to solve this problem especially for low regeneration frequency genotypes. This study aimed to evaluate the effect of panicle cold pre-treatment and the addition of putrescine in culture medium to the anther culturability of local upland rice (*Oriza sativa*) varieties originated from East Kalimantan. Two cold pre-treatment times, 8 and 10 days, at 4°C and anther culture medium with and without putrescine were examined in this

research. The result showed that cold incubation time effect was a genotype-dependent in influencing the ability of rice microspores to develope into callus and green plantlet regeneration. The longer cold incubation time, 10 days, resulted in the highest number of callus, plantlet as well as green plantlet in Serai Gunung cultivar but the opposite result was found in Geragai cultivar. The effect of putrescine addition in rice anther culture medium was also observed as genotyped-dependent. It can either increase number of callus, plantlet and green plantlet or decrease it on a specific genotype.

Anther culture, cold pre-treatment, East Kalimantan upland rice, putrescine

AO-09

Responses of the *Arabidopsis* KNOX and boron transport gene mutants against the deficiency and overdose of boron nutrient

Widi Sunaryo♥, Nurhasanah

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Boron is a micro element that is essential to the plant. Deficiency or overdose of this element results in the stunted plant growth and leads to a decline in the quantity and quality of crop plant. This research aims to study the growth response of single homozygous mutant KNOX genes (stm-GK, knat1bp-9) and transport boron genes (bor1-1, nip5; 1-1) of *Arabidopsis thaliana* compared to wild type (Col-0) againts boron deficiency and toxicity stress in invitro experiment. The sterile seeds were inoculated on the ½ MS medium containing 0 mg L-1, 3.1 mg L-1, 6.2 mg L-1, 9.3 mg L-1, and 12.4 mg L-1 H3BO3. Some seedling growth variables such as root length, leaf number and plant height were characterized to observe the response of plant againts the treatments. Results showed that different concentration of boron resulted in different effect of seedling growth of all mutants. The loss of BOR1 gene function as boron transporter at bor1-1 mutant strains and loss of NIP5;1 gene function as Protein Channel caused severe growth pressures in conditions of media without boron (deficiency). On the other hand, stm-GK and knat1bp-9 mutants showed no significant growth differences compared to the wild type (Col-0) indicating that the KNOX genes does likely not related to the function of boron transport genes.

Boron deficiency and overdose, boron transport genes, KNOX genes

AO-10

Is *Dendrobium* Sw. section *Spathulata* Lindl. monophyletic: Insight from ITS and xdh nuclear gene markers?

Agustina Y.S. Arobaya[1,♥], Ashley R. Field[2], Darren M. Crayn[2], Katharina Schulte[2], Paul Gadek[2]

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[2]Australian Tropical Herbarium (ATH), Sir Robert Norman Building (E2), McGregor rd, Cairns, 4870 QLD-Australia

Dendrobium section *Spatulata* represent a taxonomically challenging group consisting of about 75 primarily epiphytic species. The section is distributed from the Philippines southward to northern Australia (Queensland) and from Java eastwards to Samoa with a centre of diversity in New Guinea and northern Australia. Due to the high morphological variability both in floral and in vegetative characters, species delimitation and phylogenetic relationships are still poorly understood and different taxonomic concepts have been proposed. Up to now, no satisfactory molecular phylogeny for the group exists thus a test of the morphologically-based taxonomic concepts in this group is currently lacking. This project investigates the phylogeny and evolution of the Antelope orchids based on molecular DNA sequences and morphological data. Plant material was obtained from fieldwork in Australia (Queensland) and Indonesia (West Papua) and living collections at the Australian Tropical Herbarium and Centre for Australian National Biodiversity Research. For molecular phylogenetic studies, two nuclear markers (ITS and Xdh) were sequenced. Preliminary analyses of the DNA dataset provide the first insights into the phylogeny and evolution of this charismatic group of orchids.

Diversity, Dendrobium, DNA, Spathulata, orchids, phylogeny

AO-11

Preliminary study of reproduction of Nile Tilapia Fillet of Wanayasa Race (Nirwana) by the production of male

Ayi Yustiati

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Nile tilapia (*Oreochromis niloticus*) is one of the most aquaculture potential commodities to be development because has very high economics value, easy to cultivation, and has an ideal place texture to be fillet. One of the most superior nile strains in West Java is nile tilapia rece of Wanayasa (Nirwana). Commonly male nile growth faster than female an attempt that can be than to increase production of Nirwana by using sex reversal to toward

male. The process to replace fish sex can be conducted via some ways, one of them is using hormone, synthetic or natural ones. The using of synthetic hormone is not advisable because ace residue of the hormone can be harmful to environment. One alternative of masculinization process that environment friendly is the use of natural testosterone originated from cow testicle. This natural hormone can be utilized in mass production of male Nirwana because it is available in very big quantity. Former research show that, the use of cow testicle extract mixed to the media with concentration of 3 mL/L water, produces red male nile 69.07%. In addition, the use of cow testicle extract 500 µg/L in 10 hours 30 minutes results the male of nile tilapia 86.71%. Although than dipping, sex reversal also can be administrated via oral by mixing the cow testicle extract into the feed. Former research dipping of 600 µg/L 17α methyltestosterone combined with oral method of 40 mg/kg produce the highest male percentage of Java Carp (*Osteochillus hasselti*) 86.67% compared with single method namely dipping which only produces 65.56%. This result shows that combination of dipping and oral method is more efficient than single method.

Fillet, Nirwana, production of male

AO-12

Identification of growth hormone gene variation in exon region at Indonesian local cattle based on PCR-SSCP method

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The aim of this study was to identify the polymorphisms of the growth hormone gene (GH) of Indonesian local cattle breeds as well as two exotic breed as the out grouped using polymerase chain reaction and single strand conformation polymorphism (PCR-SSCP). Twenty DNA samples of each Indonesian local cattle in consists of Bali (*Bos javanicus*), Pesisir, Madura and Katingan and 10 DNA samples of Simmental and Limousine cattle (*Bos taurus*) were used. The results showed that the polymorphism of the GH gene was found in the three exon regions which are exon 1, 2 and 5 for Indonesian local cattle except for the Bali and Madura cattle that showed polymorphism only at exon 2. Bali and Madura cattle also showed monomorphism in exon 3 and 4. On the other hand, the exotic breed showed the polymorphism in all exon regions, except for exon 2 in Simmental cattle which was found to be monomorphic.

Indonesian local cattle, growth hormone gene, PCR-SSCP, polymorphism

AO-13

Biodiversity of gaga chicken from Sidrap (Sidenreng-Rappang), South Sulawesi based on correlation the bioacustic analysis and morphometric study

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[2] Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Indonesia. Kampus UI Gedung E Lt. 2, Jl. Lingkar Kampus Raya, Depok 16424, West Java, Indonesia.

Gaga chicken is one of the local ornamental chickens originating from Sidrap (Sidenreng-Rappang), South Sulawesi. Gaga chickens (*Gallus domesticus*) has the unique crowing song, like human laughing. Gaga chicken which also called "*ayam ketawa*". Gaga chicken which has long and fast crowing song is called dangdut type, while the short and slow crowing song chicken is named slow type. The objective of present study is to investigate the biodiversity of Gaga's chicken based on bioacustic and morphometric. Twenty two samples of Gaga chicken have been collected, consisted of 17 of slow type and five of 'dangdut' type, respectively. Body size data processing using SPSS version 19 for calculating the correlation between the length of the collar bone bioacustic and bioacustic with weight. While the voice recording crowing sound was measured using the software Cool Edit Pro Portable 2.1 which connects with the computer software. The result showed the average results of the bioacustic analysis based on the crowing duratio gaga chicken dangdut type (3.43 seconds) higher than slow type. The value of the correlation between the duration of the long bones of the neck crowing and the type and duration between crowing and weight equal value of 0.20. Bioacustic correlation value and morphometric analysis can be applied to determine the biological the biodiversity gaga chicken.

Bioacustic, correlation, gaga chicken, morphometric

AO-14

Comparative phylogenetics based on displacement loop (D-loop) region of mtDNA offer new insights into the biogeographic history of Sulawesi Black Macaque (*Macaca nigra*)

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Study of a comparative phylogenetic analysis to gain insight into the recent evolutionary history of Sulawesi Black Macaque (*Macaca nigra*) have been conducted. By sequencing a approximately 600-bp fragment in the

hypervariable II region of the D-loop region of 23 *Macaca nigra* lived in Tangkoko Dua Saudara National Park North Sulawesi, this study confirms that all the M. nigra sequences clustered together, showing that M. nigra is monophyletic.The homologous region was also characterized in *M. mulatta* and 2 *Macaca fuscata*. The phylogenetic analysis that confirms the monophyly of *M. nigra* indicates also indicates that there was the low nucleotide diversity in the Tangkoko Dua Saudara National Park population of *M. nigra*. This study also revealed that the M. fascicularis clade together. *M assamensis* also forms different clades. Further observation of mtDNA and nuclear genetic data need to be conducted to verify the mixed origin of *M. nigra*.

Macaca nigra, D-Loop Region of mtDNA, Tangkoko Dua Saudara National Park

AP-01

Sequence-Related Amplified Polymorphism (SRAP) analysis for studying genetic characterization of *Bouea macrophylla*

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Bouea macrophylla Griff is well-known as one of native typical fruits in Southeast Asia which needs to be preserved and continuously cultivated because of economical and ecological significances. More recently, sequence-related amplified polymorphism (SRAP) markers have been developed, which are used to amplify coding regions of DNA with primers targeting open reading frames. This technique has proven to be robust and highly variable and is attained through a significantly less technically demanding process. In this research, SRAP method was preliminary applied to assess genetic characterization of B. macrophylla. Genomic DNA was extracted from fresh leaf samples. The result clearly showed that at 100 ng template DNA and MgCl2 5 mM concentration are suitable for further PCR analysis. Thirty SRAP primer combinations were initially screened for analysis and 26 primer combinations were chosen for further analysis. A total of 222 DNA fragments, varying from 90-2500 bp, were amplified. Therefore, SRAP analysis is suitable for further analysis method on genetic study of *Bouea* species and related genera.

Bouea macrophylla, SRAP, genetic characterization

Diversity of species

BO-01

Current status of giant freshwater prawn (*Macrobrachium rosenbergii*) in Malaysia

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Giant freshwater prawn (*Macrobrachium rosenbergii*) is one of the important species of freshwater aquaculture in Malaysia. However, the sustainability of freshwater prawn farming is currently threatened by low production efficiency. In addition, the degradation of natural habitats and the use of illegal catching methods have caused great threats to freshwater giant prawn populations. Thus, the main objectives of this study were to examine the wild population, ecology, and distribution of giant freshwater prawn in natural water bodies and also to evaluate the contribution of giant freshwater prawn through aquaculture or stock enhancement in socio-economic development in Malaysia. The mean values of the physico-chemical water parameters, such as dissolved oxygen, pH values, conductivity, turbidity and temperature from four rivers surveyed were significantly different ($P > 0.05$). There were significant differences ($P < 0.05$) of total length, total body weight and eggs weight of prawn population among four rivers. However, there was no significant difference ($P > 0.05$) of prawn fecundity among four rivers. Comparisons of giant freshwater prawn retail market price were made among surveyed locations throughout Malaysia. It showed that the value and consumption of giant freshwater prawn in various states of Malaysia were significantly diverse. The present analyses have indicated that the retail prawn price trends in different locations and different communities are varied. Indeed, examining the population structure and distributions, the supply and demand of M. rosenbergii may contribute to understanding the current status and population dynamic of this giant prawn throughout Malaysia.

Giant freshwater prawn, Macrobrachium rosenbergii, aquaculture, market price, river

BO-02

Leaf diseases on *Eucalyptus pellita* F. Muell in forest plantation

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Eucalyptus pellita is often grown in monoculture; both in the nursery and in the field are susceptible to disease. Currently in the plantation of PT. Surya Hutani Jaya, Sebulu, East Kalimantan is being developed *E. pellita* derived from seed and clonal selection results were then called family. To determine the benefits of trees, the company deliberately does not preserve this area, so that will be generated trees (family) that excel both productivity and resistance to pests and diseases. This study aimed at determining the symptoms and signs of disease on the leaves, microorganisms that cause disease on leaves as well as the incidence and severity of pathogen attacked the leaves of *E. pellita*. The research was conducted at PT Surya Hutani Jaya, Sebulu, Kutai Kartanegara District, East Kalimantan and continued with the identification of pathogens at the Laboratory of Forest Protection, Faculty of Forestry, University of Mulawarman, East Kalimantan. The object of research was *E. pellita* of seedlings and 6 years old plantation, spacing of 3 x 2 m^2, the origin of clones of Riau. Symptoms of the disease found in the at the nursery were *Ramularia* sp., *Ascochyta* sp., *Cladosporium* sp., *Mycosphaerella* sp. and *Hendersonia* sp. while at the progeny test were leaf spot and leaf blight. Pathogens in progeny test were *Cercospora* sp., *Pestalotia* sp., *Curvularia* sp., *Bipolaris* sp., *Marsonina* sp., *Dactylaria* sp., *Hendersonula* sp., and *Diplodia* sp. The incidence of leaf spot pathogen was 83.3% and leaf blight was 80.6% with the severity was 12.5% and 9.7%, respectively.

Eucalyptus pellita, symptom, sign, incidence, severity, progeny test

BO-03

Crops species in community forest of the Sungai Wain Protected Forest, East Kalimantan

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The purpose of this research was to determine the species of crops cultivated by people in Community Forest in Sungai Wain Protection Forest, East Kalimantan. Purposive sampling, interviews and field observations were used to obtain primary data. The results showed that the types of annuals crops that are grown namely banana, rice, maize, ginger, celery, and others, and the perennials crops species was jackfruit, rubber, lai, durian, etc. The community planted several species of annual crops and perennial crops in community forests of the protected forests.

Annuals crops, community forest, perennials crops, purposive sampling, Sungai Wain Protection Forest

BO-04

Improvement of coal mining soil treated with top soil and fertilizer

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Operation of mining activities led to a decrease in the fertility of the soil as a medium for plant growth. Meanwhile, one of the reclamation can be done with a fertilizer to improve soil characteristics. The study aims to determine the effect of a mixture of organic fertilizer (Ostindo) and top soil to the microbial diversity in soil, soil fertility and growth of Sengon (*Paraserianthes falcataria*). This study uses a randomized block design with four treatments and five replications; P0: without top soil and without Ostindo, P1: with top soil and without Ostindo, P2: without top soil and with Ostindo, P3: mixture top soil and Ostindo. The results showed a mixture of top soil and Ostindo can increase the number of fungal genus from 2 genus (*Phytium* and *Pinicillium*) to be 5 genus (*Phytium, Fusarium, Penicillium, Aspergillus, Rhizoctonia*), the number of nematode genus from 2 genus (*Dorylaimus* and *Rhabditis*) to be 5 genus (*Dorylaimus, Parasi, Dorylaimus, Hoplolaimus,* and *Mononchus*). Mixture of top soil and Ostindo improved soil fertility in soil of coal mining, such as pH almost neutral, increase of C, N and P_2O_5 as well as the growth of Sengon was increased. In conclusion, soil microbial diversity, soil fertility and growth of Sengon in coal mining soil were increased after treated the mixture of top soil and Ostindo

Coal mining, fertilize, microorganis, soil, top soil

BO-05

Floristic dynamics of tree species at different ages of secondary forest in Sabai, Sarawak

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The process of succession is an orderly process of community development which involves changes in species structure, composition and diversity with time. There is a scarcity of information on the floristic dynamic of various stage secondary forests in Malaysia. This study was conducted to determine the floristic structure, composition, and diversity of various stage secondary forests of the study site. A total of 997, 1842, and 834 stems per hectare of woody trees with diameter at breast height (DBH) of > 5

cm were recorded in 5 years old secondary forest (hereafter called Temuda), 10 years old secondary forest (hereafter called Belukar I), and 20 years old secondary forest (hereafter called Belukar II), respectively. Ten most common species was dominated by pioneer and light demanding species in Temuda and Belukar I. In Belukar II, the occurrence of these species was not exist. *Macaranga gigantea* Mull. Arg. was the most dominant tree species in Temuda and Belukar I in terms of basal area and volume per hectare. The most common species of Belukar II was *Adinandra dumosa* Jack. based on basal area, volume, and Importance Value Index (IVi). Species diversity of Belukar I was the highest in terms of the diversity and richness indexes.

Floristic structure, composition, diversity, secondary forest, Sarawak

BO-06

Productivity of Rutai Banana Plant (*Musa* sp.) through NPK Phonska fertilizer and organic fertilizer application in Kutai Kartanegara, East Kalimantan

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Rutai banana (*Musa* sp.) is an indigenous plant of Kutai Kartanegara District, East Kalimantan. The plant has the potential to be developed as a commodity in the regions because it has sweet fruit and fragrant aroma when ripe fruit. However, since the last few years rutai banana plants are increasingly scarce existence and are not widely available in garden farmers. This is due to farmers not familiar with this plant and productivity is still very low. To preserve rutai banana plant needs to be done various efforts such as by applying good farming techniques and the right which is the provision of healthy seeds, fertilizer and garden sanitation. The purpose of this study was to provide the right information about NPK phonska fertilizer and organic fertilizer on banana rutai plants. The research was conducted in the village of Batu-Batu, Muara Badak sub-District, Kutai Kartanegara District, East Kalimantan Province in 2014. The method used a Randomized Block Design (RBD) with five replications. Factorial experiment consisted of first factor is the NPK phonska fertilizer: control (p0), 0.5 kg/plant (p1), 1 kg/plant (p2), 1,5 kg/plant (p3). The second factor is the organic fertilizer: control (n0), 1 kg/plant (n1), 2 kg/plant (n2). The parameters measured were: (i) growth components: plant height, number of tillers and timing of the interest; (ii) yield components: the harvest time, the weight per bunch, fruit weight per comb, comb number per bunch. Data were analyzed by Anova and if it was significantly different, the test will be continued by an LSD at 5%. The results showed the real interaction between NPK phonska fertilizer and organic fertilizer on all parameters observed. The dosages NPK phonska fertilizer 1.5 kg/plants and organic fertilizer 2 kg/plants provide the highest productivity.

Banana, Kutai Kartanegara, NPK phonska fertilizer, organic fertilizer, productivity

BO-07

Biodiversity of heavy metals resistant microorganism on activated sludge from Wastewater Treatment Plant in Rungkut, Surabaya, East Java

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Heavy metal pollution is a serious problem mainly caused by industrialization that produces large quantities of wastewaters containing high concentrations of heavy metals. The presence of toxic heavy metal contaminants influences microbial population in nature by reducing the number and biodiversity of species. Activated sludge consists of microbial populations which have adapted to the toxic concentrations of heavy metals and become resistant by accumulating copper inside the cells. The aims of the studies were to analize the biodiversity of heavy metals resistant microorganism on activated sludge from watewater treatment plant in Rungkut-Surabaya, and to determine the ability of microbial isolates to accumulate copper. Yeast and bacteria were isolated and characterized from activated sludge. The heavy metals resistance was determined by measuring minimum inhibitory concentration (MIC) of each microbial isolates to heavy metals. The ability of each isolates to accumulate copper were determined by atomic absorbtion spectrophotometer. The results showed that there were eight bacterial isolates and nine yeast isolates which the MICs of 6-7 mM, and 16-20 mM CuSO4, respectively. Some of bacterial isolates were Gram negative bacteria. Three highly copper resistant bacterial isolates and two highly yeast resistant isolates were designated as isolate C1, C2, C4, and isolate ES 9.3, ES10.2, respectively. Bacterial isolates accumulated copper bigger than yeast isolates, eventhough its less resistant than yeast isolates. Isolates C1, C2, and C4 could accumulate copper up to 292,93 mg, 508,01 mg, dan 371,42 mg Cu per gram dry weight of cells, respectively, meanwhile isolates ES9.3 could accumulate up to 0.52 mg Cu per gram dry weight of cells. Biodiversity of copper resistant microorganisms with its ability to accumulate copper on activated sludge may have significant role in wastewater treatment plant.

Bacteria, biodiversity, copper, resistant, yeast

BO-08

Tropical peatland tree species diversity altered by forest degradation

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Indonesian rainforest plays an important role in as home to third most extensive humid tropical rainforest and account for 2.3% of global forest cover. It contains high floral and faunal biodiversity, yet about 27% of Indonesian population depends directly on these forests for their livelyhood. Consequently, the forest experienced relatively high deforestation and degradation. The forests degradation could bring the forests into a temporary or might be permanent destruction not only in forest vegetation density and structure, but also in species composition. A study had been carried out to examine the impact of peatland forests degradation on their species diversity composition in Ketapang, West Kalimantan peatland forest. Stratified random sampling was used to distinguished forest degradation class (low, intermediate and high degradation levels) based on the differences in spectra of LandSat Image 5 and SRTM90m resolution according to the land cover gradation and confirmed with field checking by measuring forest canopy opening to confirm the degradation levels. Six to twelve of a 20 m x 100 m plots were established to sample tree structure and composition distributed along peatland landscape. All trees species diameter >5 cm was registered an species identified. Results indicated that tree diversity was significantly reduced due to forest degradation. Tree species diversity in low, intermediate, and high degraded forest was 122, 107, and 60 consecutively. Forest degradation not only resulted more than 50% of important species loss in high degraded peatland forest but also reducing ~40% tree abundance. Moreover, 17 species increased their abundance predominantly mahang (*Macaranga pruinosa*), japang (*Sandoriccum koetjape*), and japing-japing (*Melicope lunu-akenda*) in high degraded forest compared to low degraded. The species composition and abundance shifting due to forest degradation should be considered on peatland forest management to hinder permanent species loss.

Species abundance, species composition, tree species loss

BO-09

Species diversity of cerambycid beetles at reclamation area of PT. Berau Coal, East Kalimantan

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The longhorn beetles (Cerambycidae) are amongst the most popular beetle families and hence lots of research has been carried out on the family. However, the presence of this beetle in the reclamation area of PT. Berau Coal has not been investigated. PT. Berau Coal is a coal company that has long operated. In the former mining areas have been planted with reclamation plants such as *Acacia mangium*, *Paraserianthes falcataria*, *Gmelina arborea* and *Pterocarpus indicus*. This research was conducted to determine the cerambycid beetle species diversity in the reclamation area. From the results of the study found 30 species with 432 individuals beetle. When calculated with the Simpson diversity index (1-D), then it was high, namely 0.91. The high index of biodiversity in the area of the former coal mine reclamation due to the possibility of distance is not too far from the natural forest around it, so the availability of food is estimated to be sufficient to life the kinds of the beetle. Evenness index (E) was low, i.e. 0.00287, which means the distribution of the number of individuals of each species were not evenly distributed. The dominant species, sub-dominant and non-dominant species were 8, 5 and 17 species, respectively.

Cerambycida, Berau Coal, reclamation, species diversity

BO-10

Fusarium as endophyte of some terrestrial orchid from Papua

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This study was aimed to identify endophytic fungi associated with the roots of terrestrial orchid *Phaius tankervilleae* (Banks) Blume, *Dendrobium lancifolium* A. Rich var. *Papuanum* and *Calanthe triplicate* (Willem) Ames from Papua, Indonesia. The endophytic fungi were isolated from the transversal section of the orchid roots. Identification of the endophytes was carried out based on the morphological character. The phylogenetic analysis of nucleotide sequences generated from ITS rDNA region of the endophytic fungi isolated from *P. tankervilleae* showed that those isolates were determined as Fusarium solani. This is the first report of *F. solani* found as endophyte of *P. tankervilleae* in Papua. While the ITS rDNA of Fusarium isolated from *D. lancifolium* and *C. triplicate* need to be sequenced for further identification.

Endophyte, *Fusarium*, ITS nrDNA, terrestrial orchid

BO-11

Qualitative determination of secondary metabolic compounds and macro nutrients some botanical pesticide plants of East Kalimantan

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Existence of natural alternative inputs for crop husbandry was considered as important resources of good agricultural practices to attend an environmental friendly agricultural management. Pest control and soil fertility management were two main problems of agricultural development in East Kalimantan. However, there are numerous potential plants for botanical pesticide used native in East Kalimantan, and those plants also containing sufficient macro nutrients which beneficial as liquid fertilizer. This study aims to determine various secondary metabolic compounds and macro nutrients content of six botanical pesticide plants, i.e. marigold (*Tagetes erecta* L.), nimtree (*Azadirachta indica* L.), sweet flag (*Acorus calamus* L.), bratawali (*Tinospora crispa* L.), soursop (*Annona muricata* L.), and golden trumpet vine (*Allamanda cathartica* L.). Some laboratory analysis were implemented in the study, variables used to determine secondary metabolic compounds were flavonoids, steroids, alkaloid, tannins, triterpenoids, saponins. While, variables used to determine macro nutrients were nitrogen, phosphorus, and potassium. Results showed that all six botanical pesticides evaluated in this study were containing potential secondary metabolic compounds (SMC), soursop leaves containing three kinds of SMC (flavonoids, steroid, and tannin), whereas golden trumpet vine leaves only containing one kind of SMC (tannin), and the other four botanical pesticides (marigold, nimtree, sweet flag, and bratawali) containing two kinds of SMC (flavonoids and tannin). Furthermore, based on macro nutrients content analysis, marigold was the best candidate for liquid fertilizer source followed by nimtree, soursop, and sweet flag.

Botanical pesticide, bratawali, macro nutrient, marigold, nimtree, soursop, sweet flag

BO-12

Plant diversity after 16 years post minning at East Kalimantan

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Reclamation is a restoration process refers to reinstatement of the (pre-mining) ecosystem in all its structural and functional aspects including species diversity. The study objectives were to evaluate plant diversity after 16 years revegetation activities in the reclamation area of east Borneo. Plant diversity, similarity and Important Value Index (IVI) were compared between revegetated area and unmined area. 20 plots mades in transect to evaluated the presence of its vegetation. 134 woody species were recorded unmined area consist of 1 non local spesies (*Acacia mangium*) and 133 local species. 76 woody species which recorded in reclamation area consist of 25 non local species (such as *Acacia mangium*, *Cassia siamea*, *Paraserianthes falcataria*, etc) and 51 local species (such as *Dryobalanops aromatic*, *Eusideroxylon zwagery*, *Macaranga gigantea*, etc). 25 non local species and 35 local species were planted by the company but 16 woody species (21,05%) were grow spontaneously (such as *Leucena glauca, Lansium domesticum, Shorea leavis*, etc). this result suggests that only a few naturally occurring plant species of east borneo can adapt to reclamation area soil condition. Its about 81 woody species that exist in unmined area should be planted in reclamation area to restore its species diversity.

Biodiversity, herbs, trees, vegetation, woody

BO-13

Identification of gaharu tree (*Aqualaria malacensis*) and gaharu oil distillation process as the local content Included In 21st century curricullum on the subject of high level botany

Herliani

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Gaharu trees (*Aquilaria malaccensis*) belong to the Spermatophyta division, Angiospermae sub division, and Dicotyledoneae class. It is categorized as non-timber forest commodity which has high economic value in East Kalimantan. As a valuable forest commodity, gaharu has been used as a basic ingredient for perfumes, myrrhs, cosmetics and medicines. Gaharu tree is the most potential type of gaharu tree. Based on the subject of high level botany as included in the 21st century curriculum, students are encouraged to observe any local wisdom, including the identification of gaharu tree. The purposes of this study are to recognize students' concept mastery of gaharu tree identification and students' performance of gaharu oil distillation process. The activities of both identification and distillation emphasize team work to operate any technological devices. Therefore, the study was conducted. The data were analyzed quantitatively. Forty students of Biology study program who are taking high level botany subject participated in this study. They were divided into two classes: twenty one students of class A and nineteen

students of class B. The result showed that the concept mastery of gaharu tree identification for both classes were good. Class A obtained 85.71, while class B was 94.74. For distillation process activity, the mean score for class A was 87.3 and class B was 88.9. Based on the results, it can be concluded that students' mastery concept of gaharu tree identification and students' performance of gaharu oil distillation process have good critera. These could be used as the learning activities in the local content included in 21st century curriculum on the subject of high level botany.

Aqualaria malacensis, curriculum model 21st century, identification, high level botany, local content, oil distillation

BO-14

Feature of cross section, hardness, and spesific gravity some petrified wood from Loa Janan, Kutai Kertanegara, East Kalimantan

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The aim of this research was to identify some petrified wood discovered in Loa Janan, District of Kutai Kertanegara, East Kalimantan, for anatomical feature in the cross section, the hardness and the specific gravity as well. It was hypothesized that the petrified woods would be endemic hardwood species from East Kalimantan. Six specimens with different size were taken and grinded with different grit (30 to 60). Binocular microscopes were used to observe pattern of vessel included resin ducts. Digital balance and measurer glass were used to determine the hardness and specific gravity. Reference identifying book was used to identify the wood species or genus. All specimens macroscopically identified as petrified wood of hardwood, its characterized by existence of growth ring, vessels, rays and axial canals. Narrow thin rays are found in two petrified wood. Solitary pores grouping filled with mineral deposits are apparent in all of petrified wood. One of petrified wood marked by axial canals in radial direction and different colour area on it transverse surface namely reddish, dark brown, yellow and black, its probably base on its formed minerals. The hardness of specimens between 3 to 6 mosh, and it is relatively different in each specimen, where the black colour area on the surface more harder than the yellow area, and the hardnest is the white colour which probably damaged and filled with white minerals (in specimen no. 5). The specific gravity of specimens between 1715.714 kg/m^3 to 5446,667 kg/m^3. Important is, that based on identification result, the biggest petrified wood which estimated two million years old discovered in Loa Janan, as reported by newspaper and some mass media which ascertained that discovery of petrified wood is Ulin, is actually not species of ulin (*Eusideroxylon zwageri*) family Lauraceae, but most likely species of cf. *Leptospermum* family Myrsinaceae.

Eusideroxylon zwageri, hardness, Leptospermum cf., petrified wood, specific gravity

BO-15

Inventory of native orchids in Lanny Jaya, Papua

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Orchids have been over exploitation since years ago. Some of orchid's species are becoming threatened, endangered or even vanished that which may have not been found or discovered. Lanny Jaya is a new district of Papua Province, Indonesia located at latitude 03057' 08''S and longitude 138 0 25'05,02'' E.,which covers an area of 2.248 km^2. The establisment of this new district gives impact to the plant habitat especially orchids. The study was done in two locations, i.e.: Makki sub-District and Piramid sub-District. The aim of this work is to inventory orchid's species in Lanny Jaya by explorative method. The result showed that there were 37 species consist of epiphytic and terrestrial orchids.

Inventory, Lanny Jaya, orchids

BO-16

Rhizoctonia-like fungi isotated from roots of *Dendrobium lancifolium* A. Rich var. *Papuanum* and *Calanthe triplicate* (Willem) Ames in Papua

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The aim of this study was to isolate and identify *Rhizoctonia*-like fungi associated with the root of terrestrial orchid *Dendrobium lancifolium* A. Rich var. *Papuanum* and *Calanthe triplicate* (Willem) Ames in Papua. The fungi were isolated from the transversal section of the orchid roots. Two isolates has been morphologically identified as genus *Rhizoctonia*. Further identification was carried out based on the analysis of nucleotide sequences generated from ITS rDNA region. The phylogenetic tree showed that those fungi were determined as *Rhizoctonia*-like fungi.

Calanthe triplicate, *Dendrobium lancifolium*, ITS rDNA, Papua, Rhizoctonia

BO-17

The new record of five species brachiuran crabs from Mahakam Delta estuary, East Kalimantan, Indonesia

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New record of five species Brachyuran crab, *Callapa philargius* (Linnaeus, 1758), *Callapa depressa* (Miers, 1886), *Myomenippe fornasinii* (Bianconi, 1851), *Charybdis feriatus* (Linnaeus, 1758), and *Dorippe frascone* (Herbst, 1785) were collected from Mahakam Delta Estuary, East Kalimantan, Indonesia. Crabs were collected using trawl net and identified based on morphological characters.

Callapa, Charybdis, Dorippe, Mahakam, *Myomenippe*

BO-18

Wildlife diversity in Karst Forest Ecosystem of Mangkaliat Peninsula, East Kalimantan, Indonesia

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Information on the diversity of wildlife are important part of sustainable forest management, especially for karst forest ecosystem which has a unique and as an extremely fragile ecosystem to human disturbance. This study proposes to identify the diversity and the status of wildlife in the concession area of PT. Hanurata and PT. Segara Timber which are in karst forest Mangkaliat Peninsula. In this research we deployed 15 camera traps during November-December 2013, June-July 2014 and March 2015. The results showed 17 wildlife species included 13 species of Mammalia, 3 species of Aves, and 1 species of Reptilia. Of these, two are considered Near Threatened, eight are Vulnerable, five are Least Concern, and two are Data Deficient. In the concession area PT. Hanurata identified 16 species of wildlife while at PT. Segara Timber only identified 11 species. The relative frequency of wildlife species in concession of Hanurata dominated by *Tragulus napu* (17.02%), *Muntiacus atherodes* (14.89%) and *Sus barbatus* (14.89%) respectively. Meanwhile in Segara Timber concession area is dominated by *Sus barbatus* (31.25%), followed by *Macaca nemestrina, Muntiacus atherodes,* and *Helarctos malayanus* (9.37%) respectively. In conclusion, there are differences in the level of wildlife diversity in PT. Hanurata and PT. Segara Timber concession area.

Camera trap, karst forest ecosystem, Mangkaliat peninsula, wildlife diversity

BO-19

Biodiversity and carbon stock in Siawan Belida peat swam forest of Kapuas Hulu, West Kalimantan, Indonesia

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The Lake Siawan-Belida peat swamp forest is situated within a network of the largest natural inland lake/wetland system in Central Kalimantan, encompassing the Lake Sentarum National Park in the Kapuas River and surrounding waterways. A field survey was conducted on October 2015 as a preliminary survey on the biodiversity research of the lake and the carbon stock estimation. As the results, there were 10 identified flora species categorized within 8 families. The Annonaceae family were recorded, Gutiperaceae, Mirtaceae, Sapidaceae, Euphorbeaceae, Dipterocarpaceae, Sonneratiaceae and Anacardiaceae. For the Fauna, we found mammals (9 species), reptilia (7 species), aves (17 species), amphibians (4 species) and fish (25 species). Current carbon stocks estimation within the location using inputs such as land cover maps on the existing forest designation and peat distribution that are processed through a series of landsat image interpretation analyses using the following softwares: ArcGIS, Excel, and ABACUS related to carbon pool below and above ground biomass. The estimated BAU (bussines as ussual) commulative landbase up to year 2020 is 6.567.839, 34 ton CO_2 (eq). This means that the emission of BAU landbase from periods P1 (2014-2017) was 4,573,836.37 tons of CO_2 (eq) and periods P0 (2011-2014) was 2,416,551.01 tons of CO_2 (eq). Average per year is 656.784 tons of CO_2 (eq).

Abacus, biodiversity, carbon stocks, flora-fauna, peat swamp forest

BO-20

Utilization of forage under palm oil plantation for beef cattle maintenance at Paser, East Kalimantan

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The purpose of this study were (i) to identify the type of forage that grows in oil palm plantations, (ii) to measure

forage production derived from palm oil plantations, and (iii) to determine the carrying capacity of oil palm plantations in the concept of integration cattle-palm development. Data collection was done in palm oil plantations aged 3 years and 7 years in Long Ikis, Paser District, East Kalimantan Province. The method used is per 1 ha of oil palm is calculated using the quadrant size of 1 m x 1 m, 2 m x 1 m, 2 m x 2 m and 2 m x 4 m. The results showed that the forage between plants in oil palm plantations have great potential as a source of forage for cattle. The types of plants that grow under the palm trees in general as a weed, but it can also be used as a source of forage with forage production and chemical composition of nutrients that can accommodate 0.81 ST ha^{-1} at the plant age of 3 years, and ST 0.62 ha^{-1} at the plant age of 7 years. In Long Ikis district, there were three models of raising beef cattle in relation to integration beef cattle-palm oil plantation, ie (i) grazing freely in the oil palm plantation, (ii) grazing bound in oil palm plantations, and (iii) in pen.

Integration, forage, palm oil, beef cattle

BO-21

The need to develop diversity based sustainable management for seagrass ecosystem at Karimunjawa National Marine Park

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Sustainable management of the natural resources is influenced by understanding basic ecological condition, including distribution. This study aims to investigate distribution and diversity of seagrass at Karimunjawa National Park using satellite imagery GEO-EYE and ecological surveys as the basis of its management. Studies were done at several islands i.e. Cemara Kecil, Cemara Besar, Krakal Besar, Krakal Kecil, Cilik, Sintok, Menjangan Besar, Menjangan Kecil, Tengah dan Karimunjawa with a total area of 3752 hectares. While ecological surveys were carried out in two locations, namely Kemujan and Menjangan island. Satellite image interpretation results showed that seagrass were found scattered at several islands i.e. Cemara Kecil, Cemara Besar, Krakal Besar, Krakal Kecil, Menjangan Besar, Tengah and Karimunjawa. Less than 1% of seagrass percent cover was found at the island of Cilik, Sintok dan Menjangan Kecil. The highest and the lowest percent cover of seagrass ecosystems were found at island of Krakal Kecil (38.64%/6.55 ha) and Cilik (0.20%/0.06 Ha). Diversity of seagrass found was from two family, namely Hydrocharitacea (*Enhalus acoroides*, *Thalassia hemprichii*, *Halophila ovalis*) and Cymodocea (*Cymodocea serrulata*, *Cymodocea rotundata*, *Halodule pinifolia*, *Thalassodendron ciliatum*). The percentage covers of seagrass species the highest and lowest, *Thalassia hemprichii* (11.31%) and *Thalassodendron ciliatum* (0.01%), respectively. The highest and lowest individual density of each island Menjangan (280 ind/m²) and Mrican (26 ind/m²), with an average individual density of 148 ind/m². The value of diversity index ranged from low to moderate, while the uniformity index values ranged from low to moderate, dominance index value indicates there is no dominance at the study site. The results also showed that *Hemprichii thalassia* was found to have the highest importance value index (120.3). There is a need to develop diversity based sustainable management for this marine resource.

Diversity, management, Karimunjawa Islands, seagrass

BO-22

Diversity of leiognathidae fish community in high temperature waters around Bontang Industrial Estate

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The diversity and density of fish community from family Leiognathidae caught in high temperature waters around industrial estate in Bontang, East Kalimantan was investigated from January to February 2013. Fish sampling was carried out using 10 m mini-trawl during spring tide at high level water (HWL) and low water level (LWL) and in neap tide. Number of hauling was 3 to 4 times, with each hauling took 5 to 15 minutes. Fish diversity was analyzed with indexes of dominance (D), Shannon (H), and Margalef richness, but fish density with CPUE. Tidal height was observed by mean of tidal scale pole, but water depth and water current were measured with echosounder GPS map 2108 Garmin and Braystoke BFM001 current meter, respectively. Water temperature was checked using Horiba U-50 series. Surface water temperature around outlet of cooling water system was 39,5oC at HWL and 40,8oC at LWL, with water depth ranged from 10 to 12 m and tidal height of 1.03 to 2.05 m. The highest index of dominance was recorded 0,898 and species richness was 2,770. Fishes from Leiognathidae were identified having of 7 species from 3 genera and 4,736 individuals with fish density ranged from 10,379 to 353,846 individual/km^2. The most abundance species came from the genus Secutor and the lowest from Gazza.

Bontang, high temperature, Leiognathidae, petrochemical industry

BO-23

Diversity of kelulut species (*Trigona* spp.) in Mulawarman University Education Forest Samarinda, East Kalimantan

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Mulawarman University education forest is lowland Tropical Rain Forest located in the city of Samarinda, East Kalimantan, with an area of approximately 300 ha, is a miniature rain forest in East Kalimantan that rich in biodiversity. Tha objective of this study was to determine the type of *Trigona* species bees (Apidae, Meliponidea) in Mulawarman University education forest. The results were found 9 *Trigona* species (*Trigona* spp.), namely: *Trigona apicalis*, *T. Drescheri*, *T. fuscibasis*, *T. fuscobalteata*, *T. insica*, *T. itama*, *T. laeviceps*, *T. melina*, and *T. terminata*. The diversity index was relatively low (H' = 1.5 to 3.5), abundance index was relatively low (R1 <3.5), distribution index (E ') was high (E' > 0.6), and the dominance index was low (C < 1). The forest is suitable for the life and development of *Trigona* sp colony with the air temperature (23-30^{o}C), humidity (70-94%), light intensity (660 watts/m^2) and the altitude (90-210 m of sea level). Honeycomb *Trigona* sp were characterized by the building entrance of the nest, the nest was found in the conditioned area and shaded open, place the highest nest on the stump ironwood.

Bee, diversity, Trigona, tropical rain forest

BO-24

Munaan: a traditional fruit garden of Benuaq and Tunjung Dayaks tribes in West Kutai, East Kalimantan,Indonesia

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Munaan is traditional fruit garden within Benuaq and Tunjung Dayaks tribes in West Kutai, East Kalimantan, Indonesia. It consists of mixed fruit that are planted together on a piece of land and growing together with other natural regeneration of non fruit species. The structure of munaan consists of multilayers trees and diameters, i.e.: tall trees, medium trees, small trees, shrubs, herbs, ferns, rattans, and ground layer plants. The functions of munaan for local community as source of fruits, wood, medicinal plants, tools, and legality of land tenure.

Fruit garden, function, munaan, traditional structure

BO-25

Flowering, fruiting, seed germination and seedling growth of *Macaranga gigantea*

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The stages of flower and fruit development of *Macaranga gigantea*, its seed germination behaviors in nature and germination from the fruit harvesting as well as the process of raising its seedlings in the laboratory was studied to point out the potential production of *M. gigantea* seedlings widely. In term of that five trees of *M. gigantea* which were blooming and growing were chosen as the parent trees or source of seed used. Then, to observe the germination of seeds which fell down under the tree crowns, 4 sample plots of 1 x 1 m2 which followed the four cardinal directions in every sample of the trees were prepared. In addition, dry and wet extraction process was applied to determine an effective method for germination of *M. gigantea* seed, respectively. The result showed that the time required for development of *M. gigantea* flowers until the fruits were fully ripe took 5-6 months, whereas the flower buds initiated to grow in the dry season (August 2011) and the fruits were ripe in the rainy season (December 2011-January 2012). The seeds which fell off under the parent tree germinated in approximately 24 days with the total seedlings of 75-267 per m2. Instead of that, the germination in laboratory showed that the percentage and the rate of germination of the seeds extracted through wet extraction process were higher than those extracted through dry extraction process. The highest rate of germination (65%) was found in the combination of seeds extracted through wet extraction process and growth on mushroom spawn waste media. The mean germination time (MGT), the germination time of the first seed (GTFS), and the germination time of the last seed (GTLS) of the seeds with wet seed extraction were faster than those with dry seed extraction. The growth rate of seedlings planted on mushroom spawn waste media reached the highest rate (0.36 ±0.42), followed by those planted on compost media (0.15±0.09), soil media (0.10±0.04) and sand media (0.10±0.07).

Macaranga gigantea, flower, fruit development, germination, seedling growth

BO-26

Study on nudibranch distribution along depth gradient in Takat Palapa, Situbondo, East Java

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Nudibranch comes from "Nudus" means naked and "Branchia" meaning the gills. The term if both these words combined means gills are naked. The term is lead to the external respiration contained in animal body nudibranch. The ecosystem coral reefs, where nudibranch commonly found is a very complex interaction. One marine biota found in the area of coral reefs is nudibranch. Pasir Putih beach, Situbondo, East Java, Indonesia having ranges coral reefs along ± 5 km, including Takat Palapa. Coral reefs growth influenced by several factors, one of which is depth. The method used in this study is the belt transect method, with a length of 100 m and a width of 1 m (1 m to the right side and 1 m to the left side). The results, found in three families Chromodoridae, Phyllidiidae, Aegiridae. Family Phyllidiidae and Chromodorididae found relatively large amounts in Takat Palapa. Number of Nudibranchia found as many as 127 individu from 17 species.

Nudibranchia, Takat Palapa, depth, belt transect

BO-27

Population structure of mangrove crab *Scylla oceanica* in mangrove ecosystem of Tanjung Lesung, Banten, Indonesia

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Mangrove crab *Scylla oceanica* have been known as important organism and high economical value in fisheries commodity. The crab is one of the dominant crabs caught in mangrove ecosystem at Tanjung Lesung, Banten. The study was aim to determine the temporal distribution, and morphological condition based on carapace width-weight relationship of *S. oceanica*. The crabs were caught by using trap from August to November 2015. Number of crabs, sex and morphometrical carapace data were collected. The results showed that average width of the male carapace was larger (9.973 cm) than female crabs (9.341 cm), as well with an average weight of the male crab (206.08 g) was heavier than the female crabs (183.83 g). Value of b constanta of male (1.955) and female (2.123) were significantly different ($P < 0.05$). The male and female crabs have a negative allometric growth pattern. Result of the distribution analysis using the Morisita spread index Id was 1.5176, its mean the crabs were clustered distribution patterns and distribution allegedly associated with the reproductive cycle.

allometric, width-weight measure, mangrove, Banten, *Scylla oceanica*

BO-28

Morphological variations of *Meristogenys* (Anura: Ranidae) from Kalimantan

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Meristogenys is the only Bornean endemic ranids genus, which inhabited fast-flowing rocky streams in tropical rainforests of Borneo. Currently, 13 species have been published, all come from Sabah and Sarawak, but some are presumed to be present in Kalimantan. However, information related to members of the genus in Kalimantan is still very limited, although the region covers most of the area of Borneo. Here, we conducted morphological analysis in seven populations of *Meristogenys* from Kalimantan and found that they differed by the following combination of characteristics: gular and rear thigh pattern, body length (SVL), head dimensions (IOD, HW, and EL), and parts of limb dimension (1TL, 4TDW and 3DFW). The results of Hierarchical Cluster Analysis using 33 morphological characters, shows that *Meristogenys* sp. 1 (Maruwai), *Meristogenys* sp. 2 (Meratus mountain), *Meristogenys* sp. 3 (Katingan), *Meristogenys* sp. 4 (Meratus mountain), and *Meristogenys* sp. 5 (Ulu Barito) are in the closer or neighboring group and distinguishable from *M. poecilus* (Bukit Baka Bukit Raya) and *M. orphnocnemis* (Kayan Mentarang) which each forming a separate group. These findings suggest that *Meristogenys* diversity in Kalimantan probably higher than previously known, and may eventually support the discovery of new species in the future.

Morphological characters, diversity, endemic, *Meristogenys*, Kalimantan

BO-29

Plant diversity and energy potency from community forest wood species in East Kalimantan, Indonesia: Searching for suitable wood species for energy feedstock

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Nowadays, there is an increasing interest in intensifying the production and use of biomass to replace fossil fuels for the production of heat and electricity, especially for the remote area that generally abundance with the wood biomass resources including in East Kalimantan, Indonesia. In this work, diversity of plant species that commonly grown in community forest area of Kutai Timur Region, East Kalimantan, Indonesia have been studied to point out their energy potency to be used as biomass feedstock for the electricity generation. Diversity of plant species in the community forest was evaluated by making 13 sampling plots, with the approximately 20 m x 20 m size, respectively. Paralel, the energy properties of plant biomass such as proximate and ultimate compositions were also analyzed using ASTM methods. The results showed that more than 30 species of tropical wood trees and shrubs were grown in the community forest. The presence of them was classified into two different growth of origin: natural and artificial plantation, whereas the highest dominancy was found from *Paraserianthes falcataria* since the woody biomass was artifical planted for the commercial purposes. Among the 30 plant species analyzed we found the highest calorific value was obtained from *Gmelina arborea* to give 4282 kCal/kg, and the lowest one was Hyptis capitata 3537 kCal/kg. In general, we found that the wood density of plant biomass really affect the energy content. The plant species such as *Vernonia amigdalina, Piper aduncum, Gliricidia sepium, Calliandra calothyrsus, Bridelia tomentosa, Vitex pinnata, Vernonia arborea* and *Bauhinia purpurea* were suitable to be used as feedstock.

energy plant species, diversity, community forest, biomass, electricity

BO-30

Morphological identification of Nunukan chickens as germplasm preservation in East Kalimantan

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This research is a descriptive study was conducted to determine the characteristics and morphology of Nunukan chicken (*Gallus domesticus*), Kalimantan native chicken. The study was conducted by measuring the Nunukan chicken body parts included: head (length, width and thickness beak, high, wide and thick comb) body (body weight, body length, wide chest, long back, a long long wing pelvis) feet (length femur, tibia length, shank lenght, shank circumference,spurs lenght, spurs width). Based on research that has been made known that the length of Nunukan chicken head; male is 45.30 ± 4:39 mm and female 44.34 ± 4:01 mm. The width of male head was 32.09 ±2:35 mm and female 29.98 ± 1.89 mm. Lenght of Nunukan chicken beak for male was 38.03 ± 2.77 mm and female was 34.82 ± 2:14 mm. The wide of nunukan chicken beak, male was 16.74 ± 1.90 mm and female was 16.94 ± 2.93 mm. Thickness beak of the Nunukan 12.87 ± 1.29 mm for males and 11.90 ± 1:47 mm for females. The average Nunukan chicken body weight for male was 2151.48 ± 358.99 g and female was1525.18 ± 307.16 g. Average body length of Nunukan chicken male 43.91 ± 2.98 cm and females was 39.40 ± 2:24 cm. The length of Nunukan chicken wing 22:57 ± 1:21 cm for males and 19.74 cm ± 0.99 cm for females. Nunukan chicken femur length for males 11:48 ± 0.98 cm and 9.76 ± 0.85 cm females. Tibia length of 14.88 ± chicken Nunukan male and female 12:41 1:05 cm ± 0.92 cm. ThesShank length of Nunukan chicken males 10.81 ± 0.68 cm and 8.97 ± 0.63 cm for females.

Nunukan chicken, morphology identification, characteristic

BO-31

Diversity of plants from Yamor Lake in Kaimana, West Papua, Indonesia

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Yanmor Lake located in Kaimana District of the Bird Head Area of New Guinea Island, This Lake is recognised with bidiversity including Water plants. The main aim of the study is to document diversity of all plants growing at the surface of the water and the area in four sites of Yanmor Lake of Kaimana in the Bird Head Area of New Guinea Island. Based on the preliminary exploration, 13 species are recorded and collected as living materials. These species is classified into 13 genera of Ceratophyllum, Echinochloa, Eichhomio, Hanguana, Hydrilla, Ipomoea, Ludwigia, Nympphaea, Pistia, Pandanus, Polygonum, Potamogetom, Vallisneria

Yanmor Lake, plants, diversity, Papua

BO-32

Diurnal birds living in Yamor Lake of Kaimana District of the Bird Head Area of Papua

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Yamor Lake is located in Kaimana District part of the Bird Head Area of New Guinea Island. This lake was formed by two integrated land mass of the bird head area and the main land of New Guinea about 200 million years ago. This area Plays a significant role as transfly area of migrant birds and other avian in the north part of New Guinea and its satelite islands. The lake has a limited access that create a pristine protected area for bird nesting sites. The information of bird diversities from this site is poor and the area has becoming prospected habitat to be explored. The main objective of the study is to document bird diversities from the area. Transect lines method is employed in recording all birds encounter during the observation. Based on the preliminary study, 12 species are recorded and they are classified into 9 families and five of the 12 species were recognized as regular migrant birds visited Yamor lake.

Birds, diurnal, Yanmor Lake, Papua

BP-01

The age structure of nypa palm worm *Namalycastis rhodochorde* (Polychaeta: Nereididae) in Kapuas Estuarine, West Kalimantan

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The Age is one important indicator of a population structure. Recently, population of nypa palm worm in the Kapuas River Estuarine to declined due to habitat degradation and overharvesting, but has no data yet on the structure of population based on jaws measurement. The jaws were hardest part of the Polychaeta body that can be used to determining age of Nereididae. The aims of study were to determine of age structure of *Namalycastis rhodochorde*. Worms used to study as many as 312 individuals taken from Kapuas estuarine, West Kalimantan. One of jaws removed from the anterior part of the worm body and measured using a digital caliper. Age structure of nypa palm worms in Kapuas estuarine composed of one until five years old with an average three years old and predominantly of two years old.

Age, jaws, nypa palm worm, Namalycatis rhochorde, Polychaeta

BP-02

Explorative inventory of plants diversity of tropical wet highland in Mount Seblat, Bengkulu: An ex situ conservation effort

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Mountains in Sumatra are still keeping a wealth of plants diversity of tropical wet highland. As the largest national park in Sumatra, Kerinci Seblat National Park (KSNP) has high plants diversity, either vertically or horizontally. Mount Seblat, as part of KSNP, a pristine and natural mountain, particularly from disturbances and destructions by human activities. Therefore, the purpose of this study was to inventory of plants diversity which typical of tropical wet highland in Mount Seblat, and to determine the composer of plants species. Inventory activities was conducted through plants collection along the ascent route, which further the plants of field results collection will be conserved ex situ in Cibodas Botanical Garden (CBG). The study was conducted exploratory, along the ascent route from Seblat Ulu Village (641 m asl) up to altitude of 1036 m above sea level. It has conducted of plants collection, especially from seedlings, and inventory of the diversity of plants species. There were 18 points of observation of plants sample with a radius of 3 x 3 square meters per point. Plants collection was produced 380 specimens. Five groups most plants collected from family of Lauraceae as many as 18 species, Rubiaceae as many as 8 species, as many as 6 species of Anacardiaceae, Annonaceae as many as 5 species, Fagaceae as many as 4 species. In order to enrich of plants collection of CBG and ex situ conservation efforts, it also conducted of collecting plants from family of Orchidaceae, which resulted in the collection of as many as 33 species.

Collection, explorative inventory, Mount Seblat, plants diversity, tropical wet highland

BP-03

Existence of bats In Mount Walat Education Forest, Sukabumi, West Java

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Bats are nocturnal animals that belong to Chiroptera Order. The animal's role are as fruit's seeds disperser, plantation polinator, insect infection controler, and guano fertilizer producer. The study aimed to observe bats's existence and identify bats's characters in Mount Walat, Sukabumi, West Java. Bats sample derived from exploration method by using mist net and harp trap. Bats identification carried out based on the method from Suyanto (2001) and Prasetyo et al. (2011). Morfometric data of trapped bats was measured such as head and body, weight, forearm, ear, and tail. Temperature and relative humidity also measured in trap location. Result showed that there were 5 species from 3 families of bats which were recorded, namely Pteropodidae (*Cynopterus brachyotis* and *Rousettus leschenaultii*), Rhinolophidae (*Rhinolopus pussillus* and *Rhinolophus affinis*), and Hipposideridae (*Hipposideros larvatus*) in *Schima wallichii* stands. *Cynopterus brachyotis* was the most recorded bats during the research.

Bats, Chiroptera, morfometric, Mount Walat

BP-04

Introducing lichen flora of few parts of Malaysian Borneo

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Lichens are one of symbiotic organisms that are less studied in Indonesia. They have many ecological roles, especially as an indicator of environmental changes. Tropical rain forests, such as in Borneo, are well known as major sites for the biodiversity of flowering plants, and certainly provide habitats for lichens. Few parts of Malaysian Borneo, such as montane forest in Mount Kinabalu-Sabah, for example, possess varied lichen flora. Some genera that we can found in Mount Kinabalu are *Anzia*, *Baeomyces*, *Bunodophoron*, *Cladonia*, *Coccocarpia*, *Dibaeis*, *Erioderma*, *Rhizocarpon*, *Stereocaulon*, and *Usnea*. We can find many species of Graphidales or script lichens in lowland forests such as Lambir Hills National Park in Sarawak and in Gaya Island near Kota Kinabalu. Maliau Basin Conservation Area, that comprising both of lower montane and lowland forests also provide variably lichen flora.

Diversity, lichen, Malaysian Borneo

BP-05

Structure of vegetation and species diversity on difference aged of after logged over forest area

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Post logging natural regeneration generally lead to change of structure and composition of the vegetation. The aim of this research was to investigate the differences of the structure and vegetation composition on 1, 2 and 5 years after logged over forest area. Result indicated that there was a strong correlation between number of seedlings and sapling to the years after logging. However, there was no correlation between species composition to the age after logging on trees of dbh more than 10 cm. There were differences in species dominated in seedling, sapling and trees level. High diversity index differences (H'>3) was on seedlings, sapling and trees with 10-19.9 cm diameter. It was also found that the variation of composition was less in greater dbh. The similarity index between seedling and sapling, sapling and trees, and between trees with 10-19.9 cm and trees with dbh more than 20 cm was also small (<50%). There also found 6 of CR, 6 of EN, 15 of LC of IUCN red list species and 16 Borneo endemic species found in the research plots. Basal area and volume of commercial species were also increased in line with the increased of dbh so that horizontal continuity can be expected as a continuation of commercial species after logging.

Logged over area, Shannon-Wiener index, vegetation structure

BP-06

Diversity of predator of paddy plant pests on paddy field that managed by integrated pest management in South Kalimantan

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Research has done on the diversity of species predators plant pest rice on paddy fields in the Village of Pasar Kamis, Districs of Banjar, South Kalimantan in June-October 2011. Research objectives is to studying the effect of the management of rice fields done by alumni Famer Field School of Integrated Pest Management (FFS-IPM) of the presence of predatory pest rice than done by non alumni. To know the species of predators done arrest predators with a net insects.The research results show that diversity of species predators in paddy field managed by alumni slpht based on the order, the family and types relatively number is higher compared with rice fields managed by non alumni.In paddy fields managed by farmers alumni slpht predators were 6 the order, 21 the

family and 25 species, while managed non alumni were 6 the order, 18 the family and 20 species.

Diversity, paddy field, plant pest, predator, South Kalimantan

BP-07

Diversity of orchid from Arfak Mountain Nature Reserve of West Papua, Indonesia

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Arfak Mountain Nature Reserve is located in the Bird Head Area of New Guinea Island. This reserve is recognised with bidiversity including orchid plants. The main aim of the study was to document orchids diversity and distribution in the Arfak Mountain Nature Reserve, West Papua, Indonesia. The study site located in three village i.e.: Mokwam, Shoubri and Kwau. Based on the preliminary exploration, 35 orchids are recorded and collected as living and herbarium materials. These species are classified into 19 genera of *Agrostophyllum, Bulbophyllum, Cadetia, Calanthe, Cryptostylis, Coelogyne, Dendrobium, Dendrochilum, Diplocaulobium, Eria, Flickingeria, Geoderum, Goodyera, Grastidium, Macodes, Malaxis, Pholidota, Phreatia* and *Spathoglottis*.

Arfak Mountain, diversity, orchids, West PApua

BP-08

The potential of Ranggawulung Urban Forest, Subang, West Java, Indonesia as a bird habitat

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Ranggawulung Urban Forest (HKR) is protected area located in Subang, West Java, Indonesia with latitude 6o34'30"-35'0"S and 107o44'15"-45'0"E. Human activity in HKR decreasing vegetation cover, habitat fragmentation and decreasing community composition and diversity of bird species. The aim of this study was to determine diversity of vegetation and birds species in HKR, as well as to examine the use of HKR as bird habitat. The study consisted of two parts, namely the diversity of vegetation analysis using the plot with the size of 20x20 m^2, and analysis of bird species diversity using a point transect method with a radius of 50 m. the distance between point counts of 100 m for 10-15 minutes. The analysis of vegetation recorded 42 species of 19 families with a diversity index of 3.03. The vegetation used for birds activity is *Paraserianthes falcataria*, *Tectona grandis,* and *Bambusa* spp. Birds species found 34 species from 19 families with number of diversity index is 2.95. Birds are divided of guild type. First, guild of feeding, which are granivores (12%), frugivores (15%), nectarivores (6%), carnivores (15%) and insectivores (50%). Secondly, guild of nesting divided into canopies (56%), mountain side (18%), shrubs (15%), parasite (6%) and land (6%). Third, the guild origin, permanent (85%) and migrant (15%). Fourth, the main habitat guild divided into forest birds (85%), city (12%), and aquatic (3%).

Birds, guilds, ranggawulung urban forest, land usage

Diversity of ecosystems

CO-01

Dayak Desa Forest Land Use System as social capital to acquire forest management rights

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Communities have an important role to play in biodiversity conservation. The ownership of biodiversity is often become a constraint in sustainable management. The aim of this study was to explore the management system of forest land in Dayak Desa of Sanggau District, West Kalimantan, Indonesia. Survey method was used in this research. Data collection was undertaken through general field observation, key informant personal interview and respondent interview with questionare. Dayak Desa has forest land use system, where each system has its function and utilization. Dayak Desa forest land use systems are: *tawang semilas*, *tawang sebesai*, *tawang mersibung*, *tawang sepayan*, *tawang serimbak*, *tawang sampur* and Bukit Rentap protection forest. Each system has its supporting species diversity such as flora, fauna and environmental services. Forest utilization by Dayak Desa community is suitable paired to what can be produced by the land. This forest land-use system can support almost Dayak Desa community needs, such as food, clothing, housing and other secondary needs. The community

conservation efforts generate as a local knowledge that is applicable from past generation to recent generation, which is equipped with their own rules. The rules contain what the communities must do to resource management which also equipped with sanctions. This local knowledge is Dayak Desa social capital to acquire their rights to manage the forest in Hutan Desa model.

Dayak Desa, forest land use system, forest management rights, social capital, local knowledge

CO-02

Mitigation of mercury contamination through the acceleration of vegetation succession

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The success of the restoration of tailings ex-gold mining through the succession is highly dependent on the ability of plants to grow and adapt to the degraded land. Restoration through natural succession can reduce the level of contamination of mercury in the tailings, but it takes a very long time. Therefore, human intervention is required to accelerate the succession. The purpose of this research was to improve the effectiveness of mitigation of mercury contamination through the acceleration of vegetation succession. This research has been carried out in a greenhouse using an experiment with a completely randomized design. There are eight treatments consists of four indigenous species (*Dillenia excelsa*, *Melastoma affine*, *Cinnamomum porrectum* and *Casuarina junghuhniana*) grown alone (one species) and collective (more than one species) in the tailing media with a mercury content of 20 ppm. The results showed that the planting collectively of indigenous species have a mutually supportive interaction, so that increased the plant growth. In addition, collective planting two or four different species of plants, and the *D. excelsa* itself could decrease the concentration of mercury in the tailing media better until <0,002 ppm. In the *D. excelsa* and *C. junghuhniana* mercury accumulates in the roots of plants (phytostabilization) and in the *M. affine* and *C. porrectum* mercury accumulates in the shoots of plants (phytoextraction). The acceleration of vegetation succession through the right choice of plants species and planting collectively, capable to increasing the potential of mitigation of mercury contamination in the tailings.

Ex-gold mining succession, mercury contamination, mitigation, tailing

CO-03

The diversity of Pekarangan Agroforestry in the middle stream Karang Mumus Watershed, East Kalimantan

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The pekarangan (home-garden) is one form of agricultural open spaces. The pekarangan management which has a shape and land cover pattern resembles a complex agroforestry systems and its diversity of activities in integrated farming (mixed farming: crops, fishponds, and livestock) is expected to provide added value in food security for household farmer. The aim of this research was to determine the diversity of agroforestry pekarangan in the middle stream of the Karang Mumus Watershed of East Kalimantan, Indonesia. The study was conducted from March to August, 2013. The study used survey methods, questionnaires, interview, and literature study. The results showed that the coverage of agroforestry pekarangan owned by farmers is 2,160 m^2. Pekarangan managed as agrosilvopastoral systems is 14 (58.3%), as agrosilvicultural systems is 5 (20.8%), as agrosilvofishery systems is 3 (12.5%), and as agrosilvopastorafishery systems is 2 (8.4%). Agrosilvopastoral systems covered 78 species of plants and 4 species of livestock, agrosilvicultural systems covered 40 species of plants, agrosilvofishery systems covered 31 species of plants and 2 species of fish, and the agrosilvopastorafishery systems covered 44 species of plants, 3 species of livestock, and 3 species of fish. The diversity of plant species in agroforestry pekarangan in the middle stream of the Karang Mumus Watershed has functions as fruits (29.2%), ornamental plants (29.2%), vegetables (14.5%), medicinal plants (8,3%), spices (7.3%), starch producer (4.2%), miscellaneous functions (4.2%), and industrial plants (3.0%).

Agroforestry, diversity, Karang Mumus Watershed, pekarangan

CO-04

The influence of harvested area on rice production of dryland paddy farming in East Kalimantan, Indonesia

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Paddy farming is becoming the main occupation in rural areas, the potential source of income for most of farm

households, and a source of food security for a large proportion of rural families in Indonesia. Several problems related to dryland paddy farming in East Kalimantan are the low of rice production, the low of paddy productivity, the fluctuation of paddy productivity, and the variation of rice productivities among regions. The aim of this study was to determine the influence of harvested area on rice production of dryland paddy farming in East Kalimantan, Indonesia. This study collected time series data such as climate, harvested area of dryland paddy farming, rice production of dryland paddy farming, and productivity of dryland paddy. A linear regression equation was applied in data analysis to illustrate the relationship between harvested area and rice production of dryland paddy farming in East Kalimantan, Indonesia. The result of this study shows that the harvested area influences the rice production of dryland paddy farming.

Harvested area, rice production, dryland paddy, farming, East Kalimantan

CO-05

Diversity, vegetation structure and C stocks of inundated riparian forest protected from conversion to oil palm in Central Kalimantan

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Riparian zone forests that buffer stream flow by periodic inundation deserve to be protected from conversion to plantation crops. In this study, C storage and tree diversity was quantified for 5 pools (above-ground tree biomass, understorey, necromass, root and soils) in inundated and non-inundated parts of conservation forest set aside by PT. AMR (Anugerah Menara Rahmat), Central Kalimantan. We estimated C stock in the forest using RaCSA (Rapid Carbon Stock Appraisal) method in inundated and non-inundated forest sites in 4 replicates in 3 locations. Tree biomass of mixed deciduous forest trees was calculated using allometric equation developed by Chave. A specific allometric equation was developed for *Pandanus* sp. Y = 0.002X4.023 (R2= 0.903). Total C stock in inundated forest was to be 325 ton ha-1, considerably higher than that in non-inundated conditions: 144 ton ha-1. Drainage of these riparian forests may thus cause substantial C emissions if it leads to a change in forest type. Trees with DBH > 30 cm were more frequent been found in the inundated ecosystem, but all C pools except for understorey vegetation contributed to the difference of C stock. Bulk density in the inundated ecosystem was 0.5-0.8 g cm-3, significantly lower than that in non-inundated plots (0.8-1.3 g cm-3). The inundated forest was dominated by *Shorea balangeran, Callicarpa havilandii, Baccaurea edulis and Polyalthia xanthopetala, while Schima wallichii, Hevea brasiliensis* and *Macaranga gigantea* were frequently observed in non-inundated forest. In total 1017 species were recorded in the inundated forest and 1191 species in non-inundated forest. The diversity and similarity indices differed significantly ($P<0.05$) between inundated and non-inundated conditions, Indices Diversity $H'<1.0$ of inundated and $1.0<H'>3.0$ of non-inundated. Thus, differences in carbon stocks were not matched directly by differences in tree diversity, and conservation is needed of both inundated and non-inundated forest types.

Carbon stock, tree diversity, inundated and non-inundated forest

CO-06

Role of nearest remnant forest as source of seeds during forest recovery after fire in East Kalimantan

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Most of about 500 hectares lowland mixed Dipterocarp forests in Samboja Research Forest, East Kalimantan were destroyed by repeated fire 1983 and 1998, that only remaining less than 5% of undisturbed forest. Revisited permanent plot of 1.8 hectares area established by Indonesian Institute of Sciences during 1979-1981 was done in 2011 to know the current condition of tree species composition and to understand role of the nearest remnant forest as source of seeds during the forest recovery process. The observation obtain that repeated fire killed 95% of tree population in 1.8 hectare and found 92 pre-fire species regenerated in the burned area. We identified that eight species are survived from repeated fire, and another 84 species were recruited after fire. We found that 67 species of 84 species are similar to the nearest remnant forest 300-500 m distance that consist of 76% animal dispersed, 12% as auto dispersed and 12% as wind dispersed, respectively. Another eight species are similar to undisturbed forest where located in 1500-2000 m distance. The number of pre-fire species regenerated in the burned area decline gradually along 300 to 500 m distance from six to one species. Wind dispersed species of Pentace laxiflora, an endemic of Borneo that being used as commercial wood can disperse up to 500 m distance, as well as Dipterocarpus cornutus, a member of Dipterocarpaceae family. Another Dipterocarp species from genus Shorea disperse up to 400 m distance and genus Vatica up to 350 m distance. Animal

dispersed species highly contribute to forest recovery process, but in the early stage of recovery the forest dominated by short distance animal dispersed species up to 350 m distance.

East Kalimantan, forest recovery, lowland forest, remnant forest, source of seeds

CO-07

Plankton fertility in supporting fish productivity in monotonous swamps in Hulu Sungai Utara, South Kalimantan

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This study was carried out in monotonous swamps in Hulu Sungai Utara District, South Kalimantan, Indonesia. The purpose was to find out the plankton fertility in supporting fish productivity in the monotonous swamps to build a dynamic waterbody with all of its supporting aspects. The analyses were performed on plankton diversity, water quality parameters and fish production levels from 2009 to 2013. The result of Shannon-Wiener diversity index analysis for plankton in the monotonous swamps approximately exceeded the value (>2), indicating that the water condition was still good and fertile. Water quality parameters in the monotonous swamps were specific; blackish brown in color, acid and low level of oxygen with high ammonia concentration. The decreasing trends of fish productivity in the swamps were resulted from unselective fish catching, environmental pollutions and land uses changes converting the areas of conservation to keep the primary productivity of fish in high level, which will affect the increase in the productivity of swamps fish in general.

Fish productivity, plankton, water quality

CO-08

Empirical reflection on the management of natural resources biodiversity conservation in Meru Betiri National Park on the implementation of REDD+ Program as a learning program in the implementation of REDD+ in the Betung Kerihun National Park and Danau Sentarum National Park, Kapuas Hulu

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National parks as natural resources conservation area biodiversity of its existence must be maintained in order to awake the conservation type, area, functions and benefits. But the reality of the situation shows that many of the threats to the sustainability of the national park that takes the form of deforestation and degradation of the area. The impact of deforestation and degradation affects the quality and quantity of existing biodiversity within them. One of the programs that are prepared to be able to cope with the threats to the region's sustainability program is Reducing Emmision from Deforestation and Forest Degaradation plus. This research aims to probe reflection on the management of natural resources biodiversity conservation in national parks, Meru Betiri National Park in the implementation of REDD+ Program as a Learning Program in the implementation of REDD+ in the Betung Kerihun National Park and Danau Sentarum National Park, Kapuas Hulu. The collection of research data is done through the study of documents related to the overarching goals of regulation of activities Reducing Emmision from Deforestation and Forest Degaradation plus, observation and depth interview. The results showed that, first, the implementation of the program of Reducing Emmision from Deforestation and Forest Degaradation plus in Kapuas Hulu in Danau Sentarum National Park and Betung Kerihun National Park is done in an effort to reduce emissions and maintaining the existing carbon stocks as well as increase carbon absorption, in addition to creating enablen conditions in an effort improve welfare communities surrounding national parks. Second, the implementation of the program of Reducing Emmision from Deforestation and Forest Degaradation in Kapuas Hulu plus more procedural than substantial management effort in conservation of natural resources biodiversity. Third, the activities that do not involve the community in the planning, implementation and monitoring of activities as requirement in safequard or Free, Prior, income and consent principles. Fourth, the Program Reducing Emmision from Deforestation and Forest Degaradation plus held ambiguous and less because less aspirational society responded, positioning the community as the object of activities performed less basing on the real needs of the community.

Critical reflection, conservation biodiversity, management, natural resources, REDD+

CO-09

The analysis of plant biodiversity and cropping pattern of agroforestry system in Karang Mumus Watershed, East Kalimantan

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Agroforestry is a farming system or land utilization pattern that integrates trees and seasonal crops spatially and temporary on land. In Karang Mumus Watershed, East

Kalimantan almost all people practiced dry lands with agroforestry system with application of farming technology. The research had been conducted to analyze the biodiversity and cropping pattern of agroforestry system in three areas (down stream, middle stream and upper stream area). This research used survey method with direct observation of agroforestry system (mixed garden) that was developed by farmer. Total agroforestry system samples for each zone were 10, and the number of farmers was 10. The location of samples and respondents was determinated based on ownership and land usage data randomly and or structurally. Plant diversity was counted by using Shanon Index. The results showed that there were differences of species biodiversity and cropping pattern in three areas. In the upper stream, agroforestry practices were in a complex and mixed cropping, with the number of species up to 10. In the middle area, agroforestry practices were a simple agroforestry and the number of species average was 8 species. In the down stream area, the practices were a complex agroforestry which 20 species of trees and 12 species of plant were found. The cropping pattern of cash crops found were single commodity and multi-commodity (alley cropping), regular planting space and planting on the line and blocks. Several criteria to select plants cultivated in agroforestry system of Karang Mumus watershed were easy to sell, high profit/price (economic oriented), and small partially people decided to select plant species based on the daily consumption and the easy to find seed materials.

Agroforestry, cropping pattern, Karang Mumus watershed, plant biodiversity

CO-10

The role of plant parasitic nematodes on agricultural ecosystem productivity in East Kalimantan

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Plant parasitic nematode is one of the most limiting factors for agricultural ecosystem productivity in East Kalimantan. Their occurrence in agricultural field as crop pest usually undistinguished, due to their minute in size and their existent sealed in the roots or soil particles. However, plant parasitic nematode might cause yield loss up to 75%, without showed any disease symptom on crop morphologically. Perennial crop and annual crop under intensive cultivation experience high yield loss due to plant parasitic nematodes. Based on time series observation related to pest management in East Kalimantan, it was determined that plant parasitic nematode existence was neglected and no significant effort to control this pest. So, low agricultural ecosystem productivity in East Kalimantan not only caused by soil fertility problems but also the impact of population outbreak of plant parasitic nematodes due to inappropriate agricultural practices.

Agricultural ecosystem productivity, East Kalimantan, parasitic nematode

CO-11

Wood density as a proxy for tree functional group recovery after forest disturbance in lowland forest of East Kalimantan, Indonesia

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Fire and logging disturb forests in different ways and may induce differences in tree species composition during the recovery process. Given the high taxonomic tree diversity in tropical forests and low frequency of most species, functional groups are used to analyze responses to disturbance. Wood density serves as proxy for functional groups as it correlates with growth rate and successionalstatus. We compared wood density frequency profiles of forest recovery stages after forest fire and logging activity in lowland forest of East Kalimantan, Indonesia. Species inventory data in a hectare of natural forest, a forest 14 years after selective logging of trees above 60 cm DBH were compared with a forest recovering from subsequent fire events 15 and 30 years ago. The median wood density in the forest after fire disturbance (0.48 g cm-3)differed significantly from undisturbed forest (0.61 g cm^{-3}) and selectivelogging(0.62 g cm^{-3}),respectively. Forestrecovering from firehad 46% of species with light wood (below 0.45 g cm^{-3}) and 21% and 26% of trees with medium wood density in the 0.45-0.6 g cm^{-3} and 0.6-0.75 g cm^{-3} classes,.respectively. Trees in the 0.6-0.75 g cm^{-3} and 0.75-0.9 g cm^{-3} wood density class were reduced in frequency by 2% compared to undisturbed forestby selective logging, with 3% more trees in the light(< 0.45 g cm^{-3}) and heavy (>0.9 g cm^{-3}) wood density classes. Light wood species are generally fast growing pioneers regenerating in gaps after logging. The increase in species with heavy wood (>0.9 g cm^{-3}) may reflect that these are not preferred in logging. We conclude that 30 years after fire,the forest is still in an early regeneration stage, but 14 years after selective logging the tree composition is similar to that of undisturbed forest.

East Kalimantan, fire, lowland forest, selective logging, wood density

CO-12

Dissolved Oxygen budget on silvofishery pond in Mahakam Delta

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Fisheries product needs produced by a healthy system derived from the environmentally friendly cultivation continues to rise. Silvofishery system is one effort to increase the production of the healthy fisheries. The objective of the research was to determine silvofishery system, an ideal basing pattern covering mangrove capable of providing oxygen dissolved during cultivation. Indicators of the success in aquaculture were the availability of sufficient dissolved oxygen (oxygen budget). The research was conducted in the Mahakam Delta village of Muara Badak, Salo Palai, Kutai Distric, East Kalimantant and the integrated analysis laboratories, Mulawarman University for 112 days. Time series data collection was conducted once in 14 days with 4 measuring times. The measurement time was 06:00, 12:00, 18.00 and 24.00 Central Indonesian Time. The research was conducted at 5 different silvofishery pond patterns, i.e. (i) P1, 0% mangrove canopy covered, (ii) P2, 18%, (iii) P3, 35%, (iv) P4, 67%, and (v) P5, 75%. The dissolved oxygen, chlorophyll-a, temperature, pH, salinity, brightness and water depth were measured. ANOVA was used to analyze the effect of treatments to the availability of dissolved oxygen. The results showed that the pattern of mangrove canopy gave a significant effect to the availability of dissolved oxygen ($p < 0.01$). The best mangrove canopy cover pattern is 67% with the mean value of the availability of dissolved oxygen of 6.31 $mg.L^{-1}$ (121.88 ± 16.51 $kg.d^{-1}$) but only the mangrove pattern cover 18% was able to consistently maintain the availability of dissolved oxygen above period 3 mg/L during the study or an average of 5.30 $mg.L^{-1}$ (109 546 ± 8952 $kg.d^{-1}$). The best farm concerning to the dissolved oxygen budget availability in the mangrove canopy pattern was the ponds pattern P2 (18% mangrove cover) because it was able to provide consistent dissolved oxygen above the minimum requirement of dissolved oxygen budget for cultivation.

Dissolved oxygen budget, Mahakam Delta, mangrove cover pattern, silvofishery

CO-13

Stakeholder analysis on REDD+ Program in West Kalimantan

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Reduce emission deforestation and degradation (REDD+) Program is a mission to reduce emission and rate of deforestation and forest degradation. West Kalimantan Province has efforts to reduce the rate of degradation and deforestation. These activities have been carried out, either by the provincial government, local government and community groups and NGOs. But these efforts have not shown significant results due to lack of coordination among the parties with an interest in forests and land. It is necessary to conduct the stakeholder analysis to enable information and perspectives from a variety of sources. The study aims to analyze, identify and mapping the stakeholders from the various parties involved in REDD+ activities in West Kalimantan Province based on an important position, influence (power) and interest and describes the role that can be done in the implementation of REDD+. The result of in-depth interviews and track record of the activities that have been implemented by each of the stakeholders associated with program of REDD+ indicates there are six stakeholders involved directly in the management of REDD+ and included in the category of primary stakeholders. The primary stakeholders consist of BLHD, Forestry Department, GIZ Forclime West Kalimantan, IJ REDD, Working Group RAD-GRK, and Working Group REDD+. While the secondary stakeholders consist of BPDAS and BPKH (UPT Ministry of Forestry), Faculty of Forestry UNTAN, Faculty of Agriculture UNTAN and some NGO consist of PRCF Indonesia, WWF and Titian Foundation. Coordination between stakeholders in achieving the objectives of REDD+ activities have not been going well and is still limited to the project per project. In other way, the needs of giving authority to the district by the central government or provincial governments need to be clarified with a legal frame. Furthermore, to state in the future need for a paradigm shift REDD+ activities.

Forest management, REDD+, stakeholder analysis, West Kalimantan

CO-14

Rehabilitation works of mined forest lands toward degraded forest ecosystem recovery in Kalimantan, Indonesia

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An overview of mined forest lands at East, South and Central Kalimantan Indonesia was conducted to determine important influencing factors supporting degraded forest ecosystem recovery. Consecutive stages of rehabilitation works consist of reclamation-backfilling, re-contouring, re-

shaping, topsoils spreading, and revegetation-land preparation, planting, maintenance covering minimum topsoils spreading, soil acidity, plant hole size, soil improvement application (dolomite, organic-anorganic fertilizers), vegetation planting (plant species selection-quality and site matching-verified plant material sources, hardening-off, planting techniques), and land management implementation. The potential degraded forest ecosystem recovery was indicated by cover crops and fast growing species plant growths, survive primary species, decreasing surface runoff/overland flows following increasing soil infiltration capacities, decreasing soil erosion rate and it's erosion hazard, and an improved environments as habitat for incoming wildlifes. The general characteristics of potential degraded forest ecosystem recovery after rehabilitation works are: spread soil materials thickness > 70 cm, bulk density + 1,2, soil acidity > 5,5, macro nutrients (N, P, K, Ca, Mg)-low to moderate, decreasing overland flow following increasing soil infiltration capacity-moderate to high, decreasing soil erosion rate-very low to moderate, decreasing erosion hazard-very slight to moderate, growing plants of fast growing species with significant layers and land cover, and growing interline planted primary species. Viewed from the ecological aspect, in the revegetated degraded forest lands wildlife as of insects, aves, reptilia, herpetofauna and small mammals were found for feeding and also permanently lives for their regeneration following gradual habitat improvement. The ecosytem status has been identified to be prospective towards degraded forest ecosystem recovery.

ecosystem, forest lands, rehabilitation, overland flow, erosion, wildlife

CO-15

Soil texture diversity and C-organic content correlations as indicator of potential mined lands recovery in East Kalimantan,Indonesia

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Revegetation works after open mining operation have been done to rehabilitate mined lands which is considered to be initialy started by the soil function recovery. Organic matter is a key factor in the soil function recovery due to its role as nutrients source and also aggregating soil particles through microbes activities that utilize organic matter as substrates. The content of organic matter in soils is closely related to soil texture where as soil texture itself is a unique permanent soil character. Soil diversity expresses organic matter content and therefore at same time also indicates the potential mined lands recovery. This research was conducted at three sites of revegetated mined lands after revegetation works of PT Berau Coal, East Kalimantan. Soil texture characteristics was found moderately soft to clay 35-40% (BMO), soft to clay 40-50% (SMO) and soft clay >50% (LMO). Soil clay eluviations was found only at SMO (vegetation age >8 years old) and BMO (vegetation age >12 years old). The maximum levels of soil organic matter content was found very low (<1%) to low (1-2%) and gradually increase following the increase of clay contents. During revegetation works, the maximum content of C-organic was found at the 8-10 vegetation years old. Soils with clay contents 35-50% of SMO and BMO, the organic matter content upto 30 cm soil depth is controlled by the amount of clay contents, and therefore the application of soil amendment is needed to achieve soil function recovery.

Clay content, mined-out lands, organic materials, soil texture

CO-16

How to conserve a big mammals in the tropical rain forest of Kalimantan?

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The big source of salt is the sea water. Around 130 million years ago, the sea water covered many terrestial habitat included the tropical areas. After that some of them left within the habitat (called as Sepan) and play an important role as a key mineral for surviving many big animals in the forest. Salt is essential mineral for many big mammals, since the scarcity of salt affected the distribution and reproduction of rhino, elephant, orangutan, bear, deer and others. There is an idea to prepare some places for salt licking (bring salt to research location from outside), which is part of wildlife management to prosper big mammals in the region. This effort was conducted as a part of big mammals conservation in the island of Borneo.

Big mammal, conservation, salt licking, tropical rainforest

CO-17

A high biodiversity of Benuaq Dayaks Rattan Gardens, East Kalimantan

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Rattan garden is one among of the several parts of traditional land use system in Benuaq Dayak tribe in West Kutai, East Kalimantan, Indonesia. There are two types of rattan gardens namely alluvial rattan gardens and terrestrial rattan gardens. Rattan gardens rich of plant species like trees, shrubs, herbs, liana/climbers, bamboo, palms and ferns. Many species of wild animals also live or temporally come into rattan gardens for feeding. Local people grow rattan for getting cash income local use and as legality admision of land tenure. Almost all plants in rattan gardens can be used by the local people for fulfilling their daily need like building materials, fire wood, food, medicine, ritual ceremony, tools, honey be tree and many other uses.

Benuaq, biodiversity, local people, rattan gardens

CO-18

Site conditions, growth and leaf nutrient status of *Macaranga gigantea* in secondary forest of East Kalimantan

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Macaranga gigantea is an important pioneer plant species in the tropical secondary forest of Kalimantan and as far the attractive wood species was not commercially cultivated. This study aims to determine the site conditions, plant growth and nutrient status of *M. gigantea* in the secondary forest particularly after shifting cultivation activity. For this purposes, the observation plots with 50 m x 50 m sizes were made and measured to collect the data of diameter, height, soil conditions and leaf nutrient concentrations (N, P and K) of *M. gigantea* in different ages of natural growth. A simple linear correlation analysis was used to determine the relationship of plant growth with the leaf and soil nutrient concentrations as well. The results showed that the site condition of *M. gigantea* has the average of pH 4.7, CEC 5.57 mEq/100g, base saturation 30.22%, and the concentration of soil nutrients were 0.062% (N), 12.65 ppm (P), and 57.76 ppm (K). We also found that the leaf nutrient concentration was 1.94±0.13% (N), 0.22±0.08% (P) and 0.66± 0.27% (K), respectively. Moreover, the highest growth of diameter was found from the 6 years old of plant (27.88 m). The annual yield of diameter and high were 4.65 cm year-1 and 2.96 year-1 and it was gradually decreased until the 10 years old of plant. The negative correlations was observed from the soil nutrient K and growth of diameter and high of *M. gigantea* (r=0.95). On the other hands, even not significant positive correlation was observed from the K content in the leaf of plant and growth of *M. gigantea* (r=0.56). We suggested that Kalium (K) content was play an important roles on the growth of *M. gigantea* and this nutrient factor should be considered well when this species will be cultivated for the commercial purposes in the future.

Macaranga gigantea, site condition, nutrient status, secondary forest

CO-19

Characterization of 15 species of tropical wood biomass for ethanol production

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Fifteen species of woody biomass growth in the tropical forest of East Kalimantan, Indonesia and identified as *Cananga odorata*, *Aleurites molluccana*, *Paraserianthes falcataria*, *Artocarpus altilis Anthocephalus chinensis*, *Macaranga tanarius*, *Macaranga gigantea*, *Gmelina arborea*, *Artocarpus elasticus*, *Alstonia scholaris*, *Shorea leprosula*, *Acacia mangium*, *Switenia mahagoni*, *Leucaena leucocephala*, and *Lagerstroemia speciosa*, were characterized to find out and discover their potential utilization as the suitable feedstock for the biofuel (ethanol) production. Characterizations were done by evaluation of the lignin, holocellulose and cellulose contents of woody biomass including the yield of saccharification (reducing sugar) after pretreated with alkaline (NaOH) at moderate temperature. Among the 15 species of tropical wood biomass evaluated, our findings showed that *M. gigantea* was gave the highest yield of saccharified sugar (42.22%, weight of original wood basis) and also yield of theoretical ethanol (273 L/ton). We found that there have been correlations between lignin, cellulose and yield of ethanol. In general, the tropical wood biomass such as *M. gigantea*, *A. molluccana*, *G. arborea*, *A. chinensis*, and *P. falcataria* are potentially used as the feedstocks for the ethanol production due to their fast growing ability and attractive chemical composition and suitability conversion to produce high saccharified sugar and yield of ethanol.

M. gigantea, tropical forest, wood biomass, biofuel, ethanol

CO-20

Diversity and comparative characterization of *Macaranga* species collected from secondary

forests in East Kalimantan for biorefinery of unutilized fast growing wood

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Wood species for industrial forest plantation has been selected to produce construction wood materials, boards and papers, and unutilized fast growing wood as a source for biofuel production has been out of the scope for selection. *Macaranga* is widely distributed in the tropics and importance of the genus has been recognized due to its high level of growth rate and adaptability to constitute forest ecosystem. However, potency of the genus as a source for bioethanol production has not been systematically studied. We herein first report differential properties of six *Macaranga* wood species collected in East Kalimantan, Indonesia, as a raw feedstock for enzymatic saccharification for bioethanol production. Among the wood species examined, the highest sugar yield 48.6% (weight of original wood basis), which corresponds to 315 mL ethanol/kg biomass, was obtained with 5.0% NaOH at 160ººC for *M. hypoleuca*. Significant differences in the sensitivity to alkaline concentration and temperature have been found among the species. A high sugar yield, 40.4% was obtained for M. winkleri with a low alkaline concentration, 3.5% NaOH at 150ºC, while *M. motleyana* gave the sugar yield 12.8% under the same condition. *M. motleyana* required a set of the conditions with higher NaOH concentration 5.0% and temperatures over 160ºC. The harsh condition with 5.0% NaOH at 170ºC promoted delignification of all the species but *M. hypoleuca* decreased the saccharification yield by raising the temperature from 160ºC to 170ºC, probably due to decomposition of carbohydrate cores. This temperature-dependent negative effect was not observed with 3.5% NaOH for *M. hypoleuca*. These results indicate that differences in the balance between disintegration effects and excess degradation of carbohydrates are different among the species and the variation should be taken into account on screening. Thus, we found a wide range of diversity in the susceptibility to alkaline pretreatment in the genus *Macaranga* and selected the wood species giving high productivity of fermentable sugars.

Macaranga, wood biomass, biorefinery, alkaline pretreatment

CO-21

Influence of planting line width on the increment of *Shorea leprosula* at selective logging line planting system in logging concession of Balikpapan Forest Industries (BFI), East Kalimantan, Indonesia

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Recently, to obligate the sustainable forest production the Indonesian Goverment developed a silvicultural system that we know as the Selective Logging and Line Planting System (TPTJ). The application of TPTJ silvicultural systems is expected to increase the productivity of the forest by planting the target species along the planting line. This study aims to determine the growth of *Shorea leprosula* planted in different planting line width. For this purposes, 2 PUPs (permanent sample plots) with the size of 100 m x 100 m and consists of 5 planting lines as replication at the block area of PT. Balikpapan Forest Industries (PT BFI) in the District of Penajam Paser Utara, East Kalimantan, Indonesia was used to collect the data of diameter growth and basal area from 1 until 7 years old of plantation to point out the growing ability of *S. leprosula* in this planting lines system. The results showed that the average diameter growth and basal area of *S. leprosula* tree at the planting line width of 3 m was 1.47 cm/yr and 1.09 m^2/ha/yr. Mean of diameter growth and basal area of *S. leprosula* tree at the planting line width of 6 m was 2.08cm/yr and 0.90 m^2/ha/yr. Acceptance of optimal light intensity on leaf will accelerate transpiration rate and opening of stomata, thus affecting the rate of photosynthesis. The differences between planting line width of 3 m and 6 m are very significant on the growth and diameter increment, but not affect on the basal area growth of *S. leprosula* stands. This is due to the number of trees per unit area at 6 m planting line width is smaller than 3 m width. The basal area increment of tree is not only related with the diameter increment but is also affected by the number of trees per unit area.

Shorea leprosula, light intensity, silviculture, line planting

CO-22

Community structure and litterfall of mangrove ecosystem in Tanjung Lesung, Banten, Indonesia

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Litters of mangrove vegetation (leaves, propagules and stalk) are an important source of organic material in the mangrove ecosystem. The litter production for each Mangrove ecosystem is different; it is influenced by soil fertility and content of N and P. The purpose of this study was to determine community structure and production of the mangrove litterfall in Tanjung Lesung, Pandeglang, Banten, Indonesia. Data of structure and composition of mangrove vegetation conducted with 30 quadrant that placed along a transect line from the sea to the land. Size of the quadrant was 10 x 10 m^2 and distance between the quadrants 20-30m. Litter production was collected using the litter-trap (1 x 1 m^2) during two month. The diversity of mangrove vegetation consists of 7 species from 6 families (found in the quadrant), and 9 species are found outside the transect squares. At the tree level, *Excoecaria agolloca* has the highest density around 174 tree/ha with basal area around 3.52 m^2/ha, followed by *Lumnitzera racemosa* and *Avicenia officinalis*. At the poles and stakes level, the highest density, dominance, and frequency were found in *L. racemosa*. The mangrove litter production was recorded 0.141 g/m^2/day, with the largest contribution from *E. agalloca* and *L. racemosa* by 35% (0.02 g/m^2/day). The mangrove leaves provided the greatest contribution of about 0.14 g/m^2/day or 99.29%. The amount of nutrients from the litterfall that can be beneficial in the mangrove ecosystems were C (0.024 g/m^2/day), N (0,001 g/m^2/day) and P (0.0002 g/m^2/day).

Community structure, litterfall, mangrove, Tanjung Lesung

CO-23

The role of molluscs community in sustaining the function of mangrove forest in Tanjung Lesung, Pandeglang, Banten

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Molluscs mangroves as part of a mangrove forest ecosystem has an important role, directly or indirectly, to support the ecological functions of mangrove forests. Molluscs community is a component of the ecosystem that serves as litter degrader in the mangrove forest as well as the subject in the carbon cycle through the process of respiration and calcification. The bio-ecological processes involving mangrove molluscs role in supporting the function of mangrove forests, hence, it is important to studied. It can provide the basic information for mangrove forest conservation activities, including molluscs mangrove as its components. Molluscs community in the mangrove forests of Tanjung Lesung consists of 8 species with the highest density value is *Cerithidea cingulata* (187 ind /m2), then followed by *Clithon squarrosus* (99 ind/m2) and *Terebralia palustris* (42 ind /m2). *T. palustris* and *Telescopium telescopium* play a role in degrading mangrove forest litter in Tanjung Lesung. The carbon content in the shells of *T. palustris* and *T. telescopium* is 10.92 ± 2.33 and 10.32 ± 0.63% dry weight. However, the potential of both species of molluscs as carbon storage still requires further evaluation.

Molluscs community, mangrove, litter fall degradation, calcification

CO-24

Improving urban ecological environments through Biodiversity Parks: Lessons learned from working with the Aqua Danone Group

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Urban environments are often densely populated and significantly industrialized, leading to degradation in the quality of the ecological environment and diminution in the extent of open "*green space*". In order to improve the quality of the ecological environment, we need to pursue policies that include open green space as an intrinsic part of the redesign of residential and industrial environments. This re-greening of private lands requires special strategies. One way to encourage the private sector to improve the ecological environment is to incorporate greening policies as part of the Environmental Management System (EMS) of companies. Many industries are following a program known as " Green PROPER ("Performance Rating in Environmental Management")" assessment, pursuing a commitment to qualify as "Green Companies" with "Green Products". The criterion for a company to qualify for "Green PROPER" status is the implementation of practices that protect biodiversity, both in situ and ex situ. The concept of a Biodiversity Park is one particular method of ex situ conservation that matches well the criteria of the Green PROPER program. In addition to their ecological benefits, Biodiversity Parks need to be designed and enriched by programs that produce beneficial socio-economic, recreational, research, and educational outcomes. Biodiversity Parks that are well designed improve the quality of the ecological environment in urban areas. This is evidenced by the increasing richness and diversity of flora and fauna within Biodiversity Parks such as those being developed by the Aqua Danone Group.

Ecology, environment, park, biodiversity, "PROPER"

CO-25

Kalimantan Aroid's conservation in Eka Karya Bali Botanic Garden

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Borneo is a hotspot of Indonesian biodiversity, including Araceae. Deforestation and the conversion of natural forests of Borneo are leading some plants to extinct, so conservation is necessary, both in situ and ex situ. Eka Karya Botanical Garden as an ex-situ conservation institution is concerned about Araceae conservation has made six exploration activities in Kalimantan, from 2004 to 2015. These activities are needed to reviewed, to find out of what has been done and the results that have been achieved. This research was conducted with litelature studies and observations on Araceae collection and its herbarium. Based on the review, the activities of the Araceae conservation still limited to taxonomic studies, collecting, acclimatization and propagating some species that potential to be ornamental plants. Taxonomic studies have described three new Borneo species. There are 52 species that has been appointed as the garden collections. There are 3 species that successfully propagated, while 98 species are failed to be propagated and 50 species still on going propagated. There are three species that can be developed as an ornamental plant. Based on the activities that have been performed and the results, Araceae conservation is still far from the ideal expected. There were no outcome that can be felt by the community and death rate of plants is still high. Therefore, for the next stage, the activities to be performed is the selecting and developing some plants that has potential as ornamental plant, compiling ecological data into information for the relevant stakeholders, studying fenology and the other biological study that needed for the further development, collecting preliminary data for reintroduction activities, arrange and display Araceae collection plants into educational purpose; disseminating the importance of Araceae conservation into public and improving cooperation with other stakeholders to develop species that failed to be developed by Eka Karya Botanical Garden Bali.

Araceae, Bali Botanic Garden, Kalimantan

CO-26

Presence of *Eusideroxylon zwageri* (iron wood) in difference slope condition at Mulawarman University Botanical Garden, East Kalimantan, Indonesia

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The iron wood (*Eusideroxylon zwageri*) is one of the endemic wood species grown on primary and secondary forest of tropical countries including, East Kalimantan, Indonesia. It has strong wood, but the growth of its diameter is only 0,058 cm annually. Nowadays, this species is considered unsuitable for large scale plantations due to its slow growth ability. In the red list of IUCN, the status of *E. zwageri* is vulnerable. The aim of the research is to analyze the presence and population of *E. zwageri* in different slope condition at Mulawarman University Botanical Garden, Samarinda, East Kalimantan. Indonesia. The slope condition was classified to five categories, i.e.: flat (0-8%), undulating (8-15%), rolling (15-25%), moderately steep (25-40%), and steep (<40%). The results showed that the majority growth of *E. zwageri* was found in rolling slope condition with the presence of 39 individual trees and followed by undulating condition with 30 trees. The lowest presence of *E. zwageri* tree was found at the flat slope condition (3 trees). The highest presence of *E. zwageri* at the rolling slope condition was related with the location and the presence of mother trees. Due to size and weight of *E. zwageri* seed, it is not easy for the natural migration of this species even at the different slope condition.

Eusideroxylon zwageri, slope classes, IUCN status, population

CO-27

Expansion of *Acacia nilotica* stand in Bekol Savanna, Baluran National Park, East Java, Indonesia through remote sensing and field observations

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One of woody species that is known to inhabit certain savanna ecosystems is *Acacia nilotica*. The *Acacia nilotica* tree is widespread in the northern savannah regions, and its range extends from Mali to Sudan and Egypt. In 1850, it was introduced to Java, out of cultivation and spread also outside of Java islands Timor and Papua. Found in grasslands, savanna is reported as important colonizer at Baluran National Park in East Java and Wasur National Park Papua. We conducted Vegetation analysis in three areas of the Baluran Savanna namely: grazed, burned and

unburnt. Our observation result analysis showed that in terms of the three most important tree species in all of the sites that we sampled (grazed, burnt and unburnt savannas), *Acacia nilotica* appeared in each of these sites. The values however, vary between sites. *A. nilotica* Importance Value Index is highest in the unburnt savanna, with IVI reaching almost 250. The unburnt site is actually a burnt site but with moderate age or time since fire (approximately 6-7 years), whereas the burnt site is savanna with relatively young age/time since fire (few months to 1 year). We also conducted GIS analysis using Satellite Images (October 2013 and October 2014) to pick up changes in Bekol savanna. Result showed that expansion of *A. nilotica* stand occurred towards the savanna. Over dominance of the woody species *A. nilotica* could shift the savanna into another ecosystem state, i.e. secondary forest.

Acacia nilotica, Baluran National Park, GIS, invasion, vegetation analysis

CO-28

Species distribution of selaginellas in Java, Indonesia

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Selaginella is not widely used in Indonesia, although in some countries several species are very vital in traditional medicine, for example in China (TCM), India (Ayurveda) and Africa, especially for anti-cancer, anti-inflammatory and antioxidant. *Selaginella* is a herbaceous plant that requires a lot of water for growth and reproduction. This plant still uses water as a medium for fertilization. Therefore, commonly found in moist habitats and influenced by climate change. This study aims to determine the distribution of *Selaginella* in Java, Indonesia. The existence of *Selaginella* was obtained from direct collection in the field carried out in the last eight years, namely 1363 herbarium specimens as well as 557 specimens of herbarium collections of BO and 51 specimens of virtual herbarium of GBIF (i.e. BGBM, Berol, BM, CANB, K, L, P, S, WRSL). The results showed that *S. ciliaris* and *S. plana* are the most widespread species distribution and commonly found in the lowlands. *S. opaca* and *S. remotifolia* are only distributed in the highlands. The distribution of two species are restricted to the western part of Java, namely *S. intermedia* and *S. wildenowii*, while *S. repanda* commonly found in the dry areas such as karst region. The existence of other species is not dominant.

Distribution, Java, *Selaginella*

CO-29

Micro-algal bloom causing mass mortality of fish in Lampung Bay, Indonesia

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Discoloration of surface waters was appearing in Lampung bay in the beginning of October until November 2012. The bloom was caused by explosion of phytoplankton population as causative species. This event resulted in damaging impact on mass mortality of fishes that cultured in the floating nets. Surface water color was seen changing to dark reddish brown color, covering almost half of the bay. It was interesting that bloom incident still occurred and appeared in the bay to a lesser extent and frequency in the next year. This algal bloom phenomenon was caused by dinoflagellate species *Cochlodinium polykrikoides*. The population explosion of *Coclodinium* was considered as the first happening in these waters. This species is also noted as the first record of its occurrence in Indonesian waters. The highest abundance of *Cochlodinium* during the incident reached to 3.07 x 107 cells.l^{-1}. Fish mass mortality in the floating net was due to oxygen depletion to lower concentration, mainly during night time. The gills were clogging by dense phytoplankton cells, assumed as the other cause. The population explosion of *Cochlodinium* was triggered by high ratio of nitrate and phosphate concentration in the waters. The nutrient ratio of N/P was seemingly high in the waters, indicating that nitrate as a triggering factor and phosphate as a limiting factor.

Algal bloom, Cochlodinium, discoloration, fish mortalities, Lampung bay

CP-30

Mangrove forest exploration of Tambelan Islands: Species composition, mapping of mangrove forest distribution and potential threat

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Knowledge of the exact species plant composition of mangroves in any country or government is a basic and an important prerequisite to understanding all the aspects of structure and function of mangroves, as well as their conservation and management efforts. Present study is going to describe the inventarisation of mangrove species, mangrove forest mapping, and interview about mangrove use in small remote islands. This expedition has been conducted at 4th-16th November 2010 in Tambelan Islands, Natuna Sea, Indonesia. The inventarisation was conducted by survey method through the mangrove area, and the mapping was conducted by satellite imagery interpretation of ALOS AVNIR-2 acquisiton year 2009 and 2010, combined with field data of mangrove position. There were 18 mangrove species and 31 asociate species, which were the destination of expedition. The vegetation was distributed in mangrove forests in the bays, the streat narrows and covered islands. Mangrove forests in such two islands have not been threated significantly, but there were threat potential regarding of the tendency to occupy mangrove area for homeland.

Mangrove, Tambelan Island, Natuna Sea

Ethnobiology

DO-01

Karangwangi people's (South Cianjur, West Java, Indonesia) local knowledge of hunting animal wildlife

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Until the early twentieth century the majority of rural people of Karangwangi village of South Cianjur, West Java practised shifting cultivation or swidden farming (*ngahuma*) in the forest. More recently, because of population increase and road development, the forests have rarely found due to predominantly converted to alang-alang grass land of the secondary forest, upland field (*tegalan*), and settlements. While, the relict of forest has been established by the government as a nature conservation area, named the Bojonglarang Jayanti Natural Reserve. Today the forests for practicing swidden farming are very limited. However, the swidden farming is still main source the people of Karangawangi village. Some people are also involved in planting rice in the rice field (*sawah*), and annual and perennial crops in the homegarden (*pekarangan*), mixed garden (*kebon tatangkalan* or *talun*). Unlike the lowland, the Karangwangi have utilized non-fertile marginal land. In addition, some unpredictable environmental factors, such as drought and pests that are caused by some animal wildlife living in the nature conservation area have frequently occurred. As a result, most of household income of the Karangwangi people is considered very low. To fulfill daily needs of the animal proteins and the additional household income, some village people have involved in hunting wildlife, including protected animals. The poaching activities have been difficulty ceased because it has involved interrelatedly complex of socio-economic and cultural factors. The aim of this research is to access the parcise of Karangwangi village in hunting animals. The method used in this study a mixed-method, qualitative and quantitative based on ethnozoological approach. Semi-structure or deep interviews with competent informants or local experts, such as animal hunters, animal traders, informal leaders, and nature conservation staff was undertaken to collect the qualitative data. While the structure interview with respondents that are randomly chosen using questionnaire to collect the quantitative data was applied. Results of the research will be discussed in this paper namely (i) the target an species that are predominantly hunted by local people; (ii) the local knowledge of ecological context of hunting animal, and hunting techniques; and 3) use of the hunted animals for subsistence and trading to obtain additional household income.

Ethnozoology, hunting techniques, Karangwangi village, local knowledge, wildlife

DO-02

Ethnobotanical study of herbal medicine in Ranggawulung Urban Forest, Subang District, West Java, Indonesia

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Ethnobotanical study is the first time study done in Subang District, West Java focused in the surrounding area of Ranggawulung Urban Forest. This study is related to plants diversity in Ranggawulung urban forest which is under the management of Pertamina EP Field Subang. The purpose of study was to investigate and collect information from local people on the use of medicinal plants in Subang. The field study was conducted from October-November 2015 in

Subang through deep personal interview and questionnaire then all information were written and documented. Based on the diversity index of Shannon Wiener, Ranggawulung urban forest was categorized in high diversity (H'=3.64). The total number of individu in Ranggawulung urban forest was 1655 individu belonging to 179 species from 101 families and only 32 species used for traditional medicines among local peoples. The highest frequency used plant parts were leaves (47%) and fruit (17%), and followed with other parts of trunk, root, tuber, latex, bark and seed. The form of decoction was the most frequently prepared and administered orally. It was indicated that Skeleton-Muscular System Disorder (SMSD) and Endocrinal Disorder (ED) had highest use reports which came from 19 species of plants belonging to 3 families (Moracea, Meliaceae and Myrtacea) to heal the diseases including diabetic and back pain/rheumatism. It can be stated that the higher index of diversity in Ranggawulung urban forest did not directly affect the use of plants for traditional medicine. Socialization of herbal medicine used among local people has to be improved as there are many species of plants are available to heal many diseases surrounding Subang.

Ethnobotany, medicinal herbs, Ranggawulung Urban Forest, Subang District

DO-03

Antibacterial activity of *Boesenbergia pandurata, Zingiber zerumbet* and *Solanum ferox* extracts against two fish pathogens, *Aeromonas hydrophila and Pseudomonas* sp.

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This study aims to evaluate of potential antibacterial in plants herb that grows in East Kalimantan, which can later be used as a medicine for prevention and treatment of a bacterial disease caused by the bacteria *Aeromonas hydrophila* and *Pseudomonas* sp. on tilapia fish farming in East Kalimantan. This research looks at the best concentration of the three plants of extract *Boesenbergia pandurata, Zingiber zerumbet* and *Solanum ferox* to inhibit the growth of bacteria *A. hydrophila* and *Pseudomonas* sp. on tilapia in vitro by inhibition zone method and culture together. The concentrations used in this test range from 100-6000 ppm of *B. pandurata* and *S. ferox* and 25-1000 ppm extract of *Z. zerumbet*. These three extracts were chosen to be a potential medicine because in addition to having a high antibacterial activity, cheap, easily obtained, and the opportunity to be developed as a traditional medicine for freshwater fish farming. The results showed that the concentration of *B. pandurata* 600 and 900 ppm and *Z. zerumbet* 200 and 2000 ppm is the best antibacterial concentration to againt A. hydrophila, while the concentration of *S. ferox* 400 and 900 ppm inhibit bacterial growth *Pseudomonas* sp.

Aeromonas hydrophila, antibacterial, *Boesenbergia pandurata*, *Pseudomonas*, *Solanum ferox*, *Zingiber zerumbet*

DO-04

Responses to environmental and socio-economic changes in the Karangwangi Traditional Agroforestry System, South Cianjur, West Java

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In the past the swidden agriculture (*huma*) was dominant in village frontiers of West Java; the Karangwangi village of Cidaun Sub-district, Cianjur District, West Java Province is a case in point. To practise huma, a piece of forest (*leuweung*) was cleared and planted by upland rice and other annual crops, such as corn, cassava, cucumber, and various beans. After harvesting rice and other annual crops, the land was fallowed and transformed into secondary forest (*reuma*) through natural succession. Moreover, the mature secondary forest (*reuma kolot*) could be opened for rice planting again in the following year or fallowed for more than 3-5 years. People will shift to another piece of mature secondary forest for rice planting. Today, because of increasing population, decreasing forests, and increasing market economic penetration, some secondary forests are opened not only for practicing swidden farming (*huma*) but also for practicing annual non-rice crops (garden or *kebun*) and more permanent mixed annual and perennial garden (mixed-garden or kebun campuran), and establishing settlement (*kampung*) and home garden (*pekarangan*). The swidden (huma), mixed garden (*kebun campuran*), and homegarden (*pekarangan*) can be classified as traditional agroforestry, because the vegetation structure of those agricultural system is resemble to that of forest which can fulfill the ecological functions and socioeconomic needs of the people. This paper discusses innovary cultural practice among the Karangwangi community, South Cianjur, West Java which contribute toward the management of the traditional agroforestry systems in sustainable way, despite population growth, the depletion of the forests, and intensive market economic penetration

Karangwangi village, socio-economic changes, traditional agroforestry system

DO-05

Ethnobotany in traditional ceremony of Naga Tribe, Neglasari Village, Sub-district of Salawu, Tasikmalaya District, West Java

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Naga Tribe still has the local wisdom in the use of herbs for traditional ceremonies. The local wisdom in Naga Tribe is a cultural need to be preserved.The purpose of this research was to analyze the types of plants used in traditional ceremonies of Naga Tribe. The method used is descriptive method with data collection through interviews that are open ended. Analysis data is used the analysis of use value. There are 41 species of plants from 25 families that are used in traditional ceremonies of Naga Tribe is divided into three types of traditional ceremonies is *hajat sasih*, the cultivation of rice and a procession of life. Part of herbs that most widely used is the stem and leaves (26%). The average sorts of crops used been trees and herb commonly found in forest areas of Naga Tribe. A kind of herbs widely used is coconut (UV = 4.43) where used as *dupi*, *mumundingan*, tomb of pilgrimage, *ngadupa* and equipment for traditional ceremonies.

Etnobotany, Naga tribe, traditional ceremonies, use value

DO-06

Medicinal herbs biodiversity of Bogani ethnic in Bolaang Mongondow, North Sulawesi

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Bogani ethnic in District of Bolaang Mongondow, North Sulawesi is still use traditional medical system. As evidence, traditional medicine ingredients are still used in their daily living. In the case, traditional medicine was used to treat many disease, from minor disease such as head ache, cough, and influenza, to the acute one such as lung inflamed (TBC), liver and tetanus. The research's objective are: (i) to inventories and describe of medicine plant type, (ii) to study plant usage as traditional medicine ingredient for many disease, (iii) as conservation effort of traditional medicine knowledge because most of them not inherited and have limited data, and (iv) to collect scientific information regarding of peculiar property of medicine herb where is the research information is potential for pharmacology research in order to discover a new medicine ingredient. A rapprochement method for the research is ethno-directed sampling. Following Friedberg (1993) in Purwanto (2002), ethno-directed sampling methods is data collection of medicine herb material that based on local knowledge (ethnic) about medicine herbs, treatment technique, ingredients technique and others aspects that related with public health and conducted with ethno science approach. Ethno science is an approach that enable us to achieve deep understanding and reveal community knowledge system about medicine herb, treatment technique, ingredient technique and others aspect that related with public health. Qualitative and quantitative approach was used as data collection technique. In the case, qualitative methods were based on participation method and in order to get more accurate data. Quantitative method was used to analyze the respondent (informant). The result shows that there are 56 types of herbs that were used as traditional medicine material for Bogani ethnics in District of Bolaang Mongondow, Province of North Sulawesi. The herbs generally collected from forest area, garden near with settlement area and indeed from cultivation product at yard. There are 34 families of medicine herbs and most of them including family of Eupohorbiaceae, Labiatae, Verbenaceae, Araceae, and Asteraceae. There is some medicine herbs that classified as endemic that should be given priority to be immediately cultivated because the existence is more and more scarce including such as *Areca vestiaria*, *Musa* sp, *Ficus minahassae*. The herbs is almost extinct and need others proper alternative to conserve them.

Medicinal plants, people of Bolaang Mongondow, Nort Sulawesi

DO-07

Ethnobotany of medicinal plants in the Arfak Mountains

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The utilization of traditional medicinal plants in Papua differs between ethnic/one region to another, both in terms of species used, and how to mix the medicinal plants. Advances in technology have indirectly changed the mindset of society. As well as traditional societies that lived on the natural surroundings. As the presence of methods of modern medicine and the release of various synthetic drugs used community and public health service facilities traditional, leads to reduced interest in a

generation to learn the knowledge of medicinal plants that exist, resulting in the community tend to rely on modern medicine and forget about the traditional knowledge about the use of nutritious plants drug. This study aims to determine species of medicinal plants used by the public and how the preservation of traditional medicine. This research uses descriptive method by collecting data through semi-structural interview techniques which refer to the list of topics and field observations. The results showed that plant species are utilized amounted to 217 species of plants, consisting of 91 trees (41.94%), herbaceous 33 (15.21%), Herba (23.96%), Liana 11 (5.07%), bush 13 (5.99%), Bulbs 4 (1.84%), epiphytic 5 (2.30%), Terna 5 (2.30%) and grass 3 (1.38%). The use of plants as medicine stomach 22 species, drug postpartum 6 species, asthma drugs 11 species, wound medicine 11 species, Malaria 41 species, internal disease 16 species, stamina 15 species, cancer 6 species, supernatural 12 species, syphilis 5 species, febrifuge 18 species, poisoning 15 species, hepatitis 1 species, seizure 13 species, lung 15 species, carbuncle 6 species, cough 7 species, epilepsy 5 species, tooth 11 species, eye 9 (3.3%), sarampa 9 species, break bone 9 species, and HIV 1 species. Knowledge of traditional medicinal plants are not only controlled by those who have been taught the old but also the young generation.

Ethnobotany; medicinal plants; Arfak mountains; traditional medicine

DO-08

Research of medicinal plant biodiversity of the Dani tribe of Baliem Valley in Jayawijaya District, Papua

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Papua we known before as Irian Jaya is an area have a rich in biological resources, also ethnic and cultural diversity. Both of these aspects combined with the physical and geographical environment, then Papua has its own uniqueness in perception and conception communities of natural plants, including plants for used on medicine. Dani tribe who live in remote areas of Baliem Valley of Wamena Papua less contact with the outside civilization, therefore the local culture to survive for a long time. They have very close relationship nature of their environment. This research was conducted in order to explore and record the plants that are used as a drug for treating various kinds of diseases by Dani tribe in the Baliem Valley, Wamena, Papua. Knowledge of local people is also aimed at preserving traditional medicinal knowledge society because many are no longer passed down to future generations and have not been recorded. The research method is used of descriptive with qualitative technic approach. The observation methods include interviews, bibliography, documentation and description. Results of this study found 40 species of medicinal plants used to preventive and curative diseases.

Biodiversity, Plant Medicine, Dani Tribe, Papua

DO-09

The potential of understorey plants from Gunung Gede Pangrango National Park as cervixs anticancer agents

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Currently, cancer is still a threat to human life. A cancer death is expected to increase every year. Various attempts have been made to the treatment of cancer include chemotherapy. This treatment can cause toxic effects and resistance. It encourages the need for the discovery of new anticancer which have high potential and minimal side effects. One way is to develop natural materials as anticancer agents. The potential plant species for developed as an anticancer agent is understorey plants. These plants are one of the forest community members which play an important role in forest ecosystems. In addition to maintaining the hydrological and nutrient cycles, also has a great potential as a source of raw materials for drugs, such as anticancer source. This study aims to screening 97 species obtained from the understorey plants of the Gunung Gede Pangrango National Park as cervixs anticancer agents. The plant anticancer activity was determined by cytotoxicity assay of methanol extracts against HeLa cervixs cancer cells using MTT test method ((3-(4,5-dimetiltiazol-2-yl)-2.5-difeniltetrazolium bromide) according to Mosmann. IC_{50} which is an indicator of cytotoxicity was determined by probit analysis. The results showed that of the 97 plants tested, there are five potential anticancer plants i.e. *Physalis peruviana*, *Pithonia diaersifolia*, *Lantana camara*, *Clidema hirta*, and *Solanum torvum* with IC_{50} values is 67.854; 3.384; 43.544; 36.929; and 59.085 respectively. Further studies will be continued on the isolation of compounds responsible for anticancer cervixs.

Cytotoxicity, Gunung Gede Pangrango National Park, Human Cancer Cell Line HeLa, MTT assay, understorey plant

DO-10

Ethnopharmacological study on Traditional Knowledge of Medicinal Plants used in community at Sekabuk Village, West Kalimantan, Indonesia

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Local knowledge about ethnobiology especially medicinal plants used by the community is still limited studied. West Kalimantan Province has a tropical rain forest with high biodiversity. One of the areas where people still use medicinal plants from the forest is Malay and Dayak tribes in the Sekabuk village, Sadaniang Sub-District, Mempawah District of West Kalimantan Province, Indonesia. In this study, we carried out research in one village which has two characteristic: different ethnic groups live, i.e. Malay tribe and Dayak tribe and a community locates away from others. This research had two objectives: to summarize the local knowledge of medicinal plants in this village and to identify their knowledge shared by all inhabitants of each ethnic group. The research was conducted by survey for 45 days in the village. The work consisted of interviews, plant observations, and a collection of medicinal plants in five different subdistricts sites i.e. Gelombang, Malangga, Pak Nungkat, Sekabuk, and Titi Dahan. Details of plants, part(s) used, and remedy formulations were elicited from informants and voucher specimens collected for identification and deposited at Faculty of Forestry, Tanjungpura University, Pontianak, West Kalimantan. Result of research showed that there were 66 plants used for medicine. The majority of species were from the family Zingiberaceae and Lamiaceae (n=7) were the most used families followed by Myrtaceae. The leaves (108) were most frequently used, followed by roots (47), whole plant (21), top (6), stems and fruits (5), and sap (1). The methods of preparation and administration and the awareness of medicinal plants were different by ethnic groups and the living environments. There was no significant difference between the genders in the knowledge about medicinal plants. There was significant retention of traditional knowledge of medicinal plants in rural West Kalimantan. The plants used as medicine were clearly different by ethnic groups, that are Malay and Dayak. The living environments also affect the difference of used plants due to easiness to obtain plants.

Ethnic group, knowledge distribution, living environment, local knowledge, medicinal plants, West Kalimantan

DO-11

Biodiversity of non timber forest product in secondary forest of West Kalimantan

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Non timber forest product has an important role for livelihood of community around the forest. Degradation of forest has threatened some non-timber forest product. The research aimed to study the biodiversity of non-timber forest product in secondary forest area. The location was in community forest of Rumah Pelangi in Sungai Ambawang sub-District, Kubu Raya District, West Kalimantan Province. Secondary forest consists of peat swamp forest and dry forest area with coverage area approximately 100 hectare. The research used systematic sampling methods, with sampling line was 200 m, distance between sampling lines was 50 m and the amount of sampling line was 20 in each vegetation area. Result of research showed there were eleven groups of non-timber forest products; consist of food plant, medicine, dyes material, ornamental plants, craft materials, bio pesticide, aromatic material, firewood, building materials, poultry and pig fodder, and custom purposes. The ornamental plants consist of *Nepenthes ampullaria* Jack, *Nepenthes rafflesiana* Jack, *Nepenthes bicalcarata* Hook. f., *Nepenthes mirabilis* (Lour) Druce, *Cattleya* sp, *Dendrobium* sp, *Vanda* sp. and *Phalaenopsis* sp. The food plant consist of *Archidendron jiringa*, *Borassus flabellifer*, *Parkia speciosa*, *Cocos nucifera*, *Ananas comosus*, *Manihot utillisima*, *Artocarpus champeden*, *Apinia galangal*, *Mangifera indica*, *Durio zibethinus* and *Pandanus amaryllifolius*. The craft materials consist of *Calamus manan*, *Daemonorops* sp., *Oncocalamus* sp., *Dendrocalamus asper*, *Pandanus amaryllifolius*, *Gleichenia linearis*, *Dicranopteris linearis*, *and Derris elliptica. The family of non-timber forest products; consist of Rubiaceae*, *Maranthaceae*, *Moraceae*, *Liliaceae*, *Graminae*, *Euphorbiaceae*, *Colvolvulaceae*, *Apiaceae*, *Asteraceae*, and *Anacardiaceae*. The community around secondary forest area uses the product for their livelihood.

Food plant, non-timber forest product, ornamental plant, peat swamp forest, secondary forest

DP-01

Dynamics of forest communities' livelihood strategies in a changing socio-economic environment: Its implications from gender perspectives in Paser District, East Kalimantan

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The Introduction of large scale plantation project oil palm in Paser District, East Kalimantan have offered new livelihood opportunities as well as imposing constraints on the livelihood choices for local villagers. This article examines the dynamics of the livelihood strategies of the sample local villagers in Paser Districts facing such challengers, and its implications to the gender role, food security and income security from the perspective of both men and women. It is found that the changes in livelihood have caused changes in gender role, seen from the division of work and time allocation between men and women. The adoption of new livelihood strategies apparently increases the time allocated for productive and reproductive activities undertaken by both men and women. Interestingly, the data show that the total increase is relatively higher for women compared to men. The changes in livelihood strategies have also caused changes in food security and income security from the perspective of men and women in relation to the NTFPs and other forests resources use changes, with a striking feeling of less security of the women among the oil palm farmers. Some suggestions and recommendations are posed relating to these facts.

Forest, gender, livelihood, NTFPs, oil palm

DP-02

Growth and results of several superior variety of soybean on dryland in Parigi Moutong District, Central Sulawesi

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Soybean demand will continue to increase in line with population growth. In the next five years (2010-2014), soybean demand increase up to 2,300,000 tons of dry each year, but capacity of domestic production is currently only able to meet the 851,286 tons or 37.01 % of total domestic demand . So as to meet these needs , Indonesia has to import . Some of the problems that lead to low domestic production, is declining vast empire and soybean harvested area , low productivity at the farm level is 13.78 ku/ha, whereas the level of 20.00 to 35.00 my research/ha . This gap results strongly influenced by the level of soil fertility and the application of technology. In addition , extensive land holdings of farmers narrow (< 0.5 ha) and price competition among commodities , where prices are cheaper than imported soybean soybean prices in the country. One important factor in increasing the productivity of soybean farmer level is the availability of quality seeds and varieties that have the power tinggi. Goals of this activity is to introduce new varieties (VUB) soy products as well as the Agency for Agricultural Research and escort accompanying extension and farmers (farmer groups) in Soybean PTT apply . VUB used in this activity is Willis, Anjasmoro, Argomulyo, Tanggamus, Kaba , and Dering 1. Results showed that the variability of agronomic observations of each variety gives different results . Likewise, the resulting production . Varieties Anjasmoro and Willis, gives better results compared with other varieties. The resulting production of each variety is Anjasmoro 2.5 t/ha, Willis 2.2 t/ha , Tanggamus 2.08 t/ha , Dering1 2.08 t/ha, Kaba 1.6 t/ha and Argomulyo 1.6 t/ha dry pods .

New varieties, soybeans, dry land

DP-03

The power of yields of Inpari 13 rice variety in Sigi District of Central Sulawesi

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The use of improved varieties is one of the essential technology components in efforts to increase national rice production and productivity. Rice varieties are superior to a region not necessarily show the same excellence in other areas, because Indonesia very diverse agroecologically. Since released in 2010, Inpari 13 has been widely known and grown by farmers in Indonesia. Based on the description, Inpari 13 has the potential yield of 8.0 t/ha with an average yield of 6.6 t/ha GKP. In Central Sulawesi, Inpari 13 known in 2012 through a display of varieties carried out by the Office of Agriculture of Central Sulawesi Province to implement the task of assisting the SL-PTT rice, such as in Sigi District. The purpose of this study was to determine the adaptability of Inpari 13 in six villages in Sigi District; each location area is 0.25 ha. The analysis showed performance in each region is different, including the number of productive tillers, panicle length, number of grains per panicle, 1000 grain weight and productivity. Productivity in the respective locations ranged from 4.9 to 10.9 t/ha GKP. Low productivity was found in Lawua village and the highs of 10.9 t/ha GKP in Kaleke village.

Inpari 13, rice variety, Sigi, yields

Bioscience

EO-01

Goramy spermatozoa quality after sub-zero freezing: The role of coconut water as the extender

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The coconut water effect combined with 5% of glycerol for preserving goramy spermatozoa at-34°C for 48 hours has been studied. The objective of study is to find the best combination among 0%, 21%, 23%, 25% 27%, and 29%, respectively, of coconut water combined with 5% of glycerol for maintaining the good spermatozoa motility and viability, and minimizing spermatozoa abnormality. One part of semen/sperm were mixed with three parts of solvent (5% of glycerol + fish ringer + coconut water), and were equilibrated at 4 °C for 45 min. The diluted sperm were then freezed at-34°C for 48 h. Cryopreserved sperms were thawed at 30°C for 3-5 min. Spermatozoa quality were evaluated before and after sub-zero freezing. Based on Kruskal-Wallis test, spermatozoa motility and viability were higher than control ($P<0.05$), while the spermatozoa abnormality were not significantly different compared to control ($P>0.05$).Twenty five percent of coconut water combined with 5% of glycerol were the best combination for preserving spermatozoa motility (80.36 ± 1.54)% and spermatozoa viability (82 ± 1.86)%, and also minimized spermatozoa abnormality (10 ± 1.03)%.

Coconut water, 5% glycerol, spermatozoa quality, sub-zero freezing

EO-02

Effifacy tests for *Trichoderma* sp. as control to foot rod disease on pepper plants

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Foot rot disease is an important disease in pepper. *Phytophthora capsici* is kind of fungus that can turn off the pepper plants in a relatively short time. The aim of this research was to determine the application effect of two organic materials (groats and bran) and *Trichoderma* spp. to the level of foot rot disease in pepper plant. This research was hold by using Randomized Block Design (RBD) with four treatments and five replications so the number of experiment was 20 units. A unit of experiment consist 16 plants so that overall was 320 plants. In this study, we used two test factors i.e. mixture of two organic material (groats and bran) and *Trichoderma* spp. (*Trichoderma viride* and *Trichoderma harzianum*). The treatment included M0 = soil without treatment as control, M1 = mixture of two organic material (groats and bran) and *T. viride*, M2 = mixture of two organic material (groats and bran) and *T. harzianum* and M3 = mixture of two organic material (groats and bran), *T. viride* and *T. harzianum*. The result of this research showed that the application of *T. viride* stimulated 0.87 cm of plant height and 5.90 of leave strands, while *T. harzianum* stimulated 0.88 cm of plant height and 6.85 of leave strands. *T. viride* reduced 8.75% of foot rot disease and 8.75% of yellow diseases, while *T. harzianum* decreased 5.00% of foot rot disease and 7.50% of yellow diseases. Efficacy tests for *T. viride* application for 0-20 weeks after planting effective reduced 56% of foot rot disease and 53% of yellow disease, but *T. harzianum* reduced 75% of foot rot disease and 60% of yellow disease. The combination of *T. viride* and *T. harzianum* was not better than singly.

Efficacy test, *Trichoderma* spp., pepper, foot rot disease

EO-03

Phenotypic detection of extended spectrum betalactamases in bacterial isolates from meat products sold within Kaduna Metropolis in Nigeria

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The global increase in bacterial resistance to antibiotics leading to treatment failure and the suspicion that environment is a possible cause of resistance spread led to the conception of the idea of this study. A total of 128 bacteria were isolated from four different meat products (Bulangu, Dambun Nama, Killishi and Tsire) sold within Kaduna metropolis in Kaduna state of Nigeria. These include; *Escherichia coil* (38), *Klebsiella pneumoniae* (20), *Salmonella typhoid* (18), *Serracia mercescens* (12), *Citrobacter friendii* (15) and *Proteus vulgarisms* (25). The isolates were subjected to screening for ESBLs production using Clinical Laboratory Standard Institute (CLSI) breakpoint while organisms that were positive in the screening test were subjected to confirmation using Double Disc Synergy Test (DDST). The results of ESBLs screening revealed that 38 (29.69%) were positive while 19 (14.84%) confirmed ESBLs producers. This finding in ready to eat meat products is of great public health concern that implicate environment as a possible source for the spread of (ESBLs) resistance bacteria.

ESBLs, bacteria, meat products, Kaduna, occurrence

EO-04

Utilization of clay to improve the strength properties of wood

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The wood preservation treatment on the clay material in a manner impregnated aims to improve the strength properties of wood, especially bending strength. Impregnation is the process of inserting the material into the timber by means of a vacuum-press the preservation full-cell process. The material used because the clay is a natural and harmless to humans. This research method is to make a test wood sample species of *Trema orientalis* with a size of 3 cm x 3 cm x 30 cm were impregnated with clay at a pressure of 60 psi for 2 hours in a concentration of 5%, 7.5% and 10%, finished wood impregnation process oven-dried at a temperature of 70°C for a week, then tested retention and penetration value with a reagent solution.. The strength of impregnated samples tested using universal testing machine (UTM). The results showed that impregnation with clay at a pressure of 60 psi for 2 hours can result in retention (18.67, 25,67, 39.69) kg/m^3 at a low concentration to high and penetration of 100% in all three types of concentration. The strength values based solution concentration in the samples without impregnation 262.64 kg/m^2, while the concentration of 5%, 7.5% and 10% respectively of 263.80 kg/m^2, 269.59 kg/m^2, 269.83 kg/m^2. The percentage weight loss of test termite attack based treatment is 23.128% for the control, 6.118%, 1.253%, 2.876%. Based on the results of the chemical analysis of clay containing metallic elements Fe, Pb, Zn and Cu were respectively: 2781.96, 9.36, 7.25, 3.66, and other metal elements whose value ranges from 0.08-2, in mg/100g. Wood treated with clay can improve the quality of wood.

Clay, strength, wood

EO-05

Biosorption of lead using macroalgae *Eucheuma spinosum*, *Padina minor* and *Sargassum crassifolium* in aqueous solution

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Lead is one of water pollutants problems emerged highly concentration in watershed of Jakarta city, Indonesia. Biosorption using macroalgae is the efficiently method to eliminate heavy metals from liquid waste. *Eucheuma spinosum*, *Padina minor* and *Sargassum crassifolium* are origin strain of macroalgae from Indonesia was used to analyze the ability of biosorption for the lead uptake from aqueous solution. Samples collected at Pari and Pramuka Island, Seribu Island were extracted to absorb lead with variety of adsorption time of 10, 20, 30, 45, 60, 90 and 120 minutes and variety of initial concentration of lead, 200, 300, 400,500, 750 and 1000 mg/L, using triplicate assessment at the pH 5. The highest adsorption of lead was ranged in 93-95% in concentration on 500 mg/L for *E. spinosum* and *P. minor* and 1000 mg/L for *S. crassifolium*. A rapid initial sorption period was followed by a longer equiliblirum period. *E. spinosum* and *P. minor* reached equilibrium within 20 and 30 min. of exposure while *S. crassifolium* needed 120 min. *Sargassum crassifolium* was showed increasing trend of absorption ability up to 1000 mg/L of lead exposure. Thus, It was assumed that *S. crassifolium* had high ability to absorb higher concentration of lead. Correlation was found significantly ($p<0.05$) between adsorption time and total concentration time lead absorbed among all samples.

Biosorption, *Eucheuma spinosum*, lead, macroalgae, *Padina minor*, *Sargassum crassifolium*

EO-06

Impact of mono-cable winch and bulldozer system on biodiversity in forest harvesting

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Forest harvesting using a bulldozer creates significant environmental impacts and poor quality residual stands. We implemented the application of the more environmentally-friendly method of timber harvesting using a mono-cable winch and 20 horsepower (HP) and 26 HP engines in a natural forest timber concession in East Kalimantan, Indonesia. Our study observed the productivity of mono-cable winches in comparison with bulldozer use and the extent mono-cable winches reduced damage to residual tree stands. Our study demonstrates that conventional methods such as bulldozer skidding created damage at seedling, sapling, pole and tree levels of vegetation in greater tendency around 15.34%, 9.91%, 10.75% and 34.54% when compared to the mono-cable winch skidding producing less environmental damage only 14.12%, 7.88%, 1,16% and 7.55% at slope $\leq$ 40% and 14.08%, 1.92%, 1,70% and 8.00% at slope $\geq$ 40% which means that mono-cable winch skidding can maintain higher levels of biodiversity at various levels of vegetation by 1.22-26.90%. Through the use of mono-cable winches

residual damage to tree stands could be reduced. Winch-based skidding systems are rarely used in tropical forestry, but their effectiveness, operational simplicity and reduced environmental impacts indicate that such systems could make a major contribution to reduced impact logging, especially in the forest concession.

Biodiversity, log skidding, mono-cable winch, productivity, reduced-impact logging

EO-07

Antioxidant and toxicity properties of anthocyanin extract from several fruit and flower

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Flowers, fruit and vegetables are colored by anthocyanins. Each flower, fruit or vegetables have its own unique mixture of anthocyanins, resulting in unique shades. Plants use them to protect themselves from 'sunburn', generating anthocyanins in the presence of intense light. The aim of this study was to investigate and compare several extracts obtained in flower and fruit with different 1% HCl-ethanol and ethanol extraction. The red and purple shades of 4 flowers and 4 fruit were extracted with 2 different solvent, 1% HCl-ethanol and ethanol. These extracts were then screened for Total Phenolic Content (TPC), Total Flavonoid Content (TFC) and Total Anthocyanin content (TAC). The TPC, TFC, and TAC were determined by Folin-Ciocalteu, AlCl3 and the pH method, respectively. Antioxidant activity was measured through diphenyl-1-picrylhydrazyl assay. Brine shrimp lethality test was performed to estimate the toxicity of sample. The obtained result was analyzed and compared to commercial standard. The TPC, TFC, TAC range from 207.75-4200.93 mg gallic acid equivalents (GAE), 688.85-3147.91 mg catechin equivalents (CE), 0-102.38 mg cyanidin-3-glucosyde equivalents (CGE) per 100 g dry weight sample, respectively. The lowest IC50 of antioxidant values of 9.95 and 12.87 µg/mL were observed for the ethanol extracts of *Jatropha integerrima* Jacq and *Melaleuca malabathricum* L flower. Among the tested extracts, 4 were active in the brine shrimp assay with LC_{50} range of 78-325 µg/mL.

Anthocyanin, antioxidant, toxicity, flower, fruit

EO-08

Antimicrobial potency of *Carica papaya, Ipomoea aquatica, Alpinia galanga,* and *Piper betle* on the invitro growth of the aquatic microbes

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Carica papaya, *Ipomoea aquatica*, *Alpinia galanga* and *Piper betle* have been used as food and traditional medicine. This research aimed to investigate the antimicrobial potential of extract of four plants as potential againt *Aeromonas hydrophyla, Pseudomonas* sp., *Escherichia coli*, and *Saprolegia* spp., pathogenic microbial on the aquatic. Dried leaves of *C. papaya, I. aquatica, A. galanga* and *P. betle* were extracted with water and ethanol, separately. The extract of the plant were tested the inhibition effect by in vitro agar disc diffusion (ADD) at the concentration 100, 200, 400, 600, 800, and 1,000 ppm and minimal inhibitory concentration (MIC) at the concentration 600, 800, and 1,000 ppm. The result showed that water or ethanol extract of *C. papaya, I. aquatica, A. galanga* and *P. betle* showed potent inhibitor against *A. hydrophyla, Pseudomonas sp., E. coli*, and *Saprolegia* spp. The ethanol extract of *P. betle* showed the highest inhibition at 800 ppm, with inhibition zones to *A. hydrophyla* 12.33±0.58 mm, *Pseudomonas* sp. 12.33±0.58 mm, *E. coli* 12,67±0.58 mm and *Saprolegnia* spp. 12.67±0.58 mm. One thousand ppm ethanol extract of P. betle had the best inhibit the growth of microbes in MIC method to *A. hydrophila* 189.67±5.03 cfu/mL, Pseudomonas sp. 253±9.17 cfu/mL, *Saprolegnia* spp.169.33±6.03 cfu/mL, and 800 ppm to *E. coli* 172.67±5.51 cfu/mL.

Antimicrobial, *A. galanga, C. papaya, I. aquatica, P. betle*

EO-09

Phytochemical screening and antioxidant activity of selekop (*Lepisanthes amoena*) fruit

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Selekop (*Lepisanthes amoena*) fruit is one of plants that used it leaves by the Dayak tribes in East Kalimantan as traditional cometics. Selekop fruit is also edible, but not so well known. This research was conducted in order to determine the phytochemical content and activitiy of antioxidant in the flesh, seed and pericarp of fruit extracts. Phytochemical analysis was conducted on ethanol extract flesh, seed and pericarp for identification of alkaloids, flavonoids, saponins, tannins, carbohydrates, triterpenoids and steroids. Antioxidant testing was used 2,2-diphenyl-1-picrylhydrazyl hydrate (DPPH) with ascorbic acid as positive control. Flesh contained flavonoids, saponins, tannins, and carbohydrates, seed contained alkaloids, flavonoids, saponins, tannins, carbohydrates and triterpenoids, pericarp contained alkaloids, flavonoids, saponins, tannins, carbohydrates and triterpenoids. Analysis of antioxidant activity in the IC50 value 122.51 ppm of flesh, 63.3 ppm of seed, 53.21 ppm of pericarp and 3.06 ppm of ascorbic acid. Based on the results of this study, seed and percarp extracts have better antioxidant than the flesh, wich are related with phytochemical analysis.

Antioxidant, *Lepisanthes amoena*, phytochemical

EO-10

Potential advantages of ruminant livestock in Kalimantan

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Beef self-sufficiency is one of the strategic objectives of agricultural development 2015-2019. Activities to increase the production of feeder cattle/local beef implemented including in the development program of integration of cattle and crops. South Kalimantan, East Kalimantan, Central Kalimantan, and West Kalimantan provinces designated as four development areas locations of system integration cattle and palm oil. This study aims at identifying the potential advantages of ruminants in Kalimantan. Data used in the form of time series data the population of ruminants (beef cattle, dairy cattle, buffalo, goat, and sheep) in the province of South Kalimantan, East Kalimantan, Central Kalimantan, and West Kalimantan 2009-2013. Data were analyzed using the Location Quotient (LQ), the growth rate of population, and Klassen typology. The research concludes that the potential advantages of ruminants in Kalimantan are: (i) Prime commodities namely buffaloes (South Kalimantan) and goat (West Kalimantan); (ii) Potential commodities namely beef cattle (West Kalimantan, Central Kalimantan, South Kalimantan, East Kalimantan), buffalo (South Kalimantan, East Kalimantan); (iii) Developing commodities namely dairy cattle (West Kalimantan, South Kalimantan, East Kalimantan), buffalo (West Kalimantan), sheep (Central Kalimantan), and (iv) Undeveloped commodities namely dairy cattle (Central Kalimantan), goat (Central Kalimantan, South Kalimantan, East Kalimantan), sheep (West Kalimantan, South Kalimantan, East Kalimantan).

Klassen tipology, potential advantages, ruminants

EO-11

Climate change mitigation: The potential of palm oil waste as a sourca of raw material of solar cell

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This paper presents a method for processing the palm oil waste as a raw material for photovoltaic application. This research is one of the action of climate change mitigation for reducing greenhouse gas emissions by applying reduce, reuse and recycle programs for handling the wastes and makes use of the clean and renewable alternative energy. The resulting material, viz. silica, has purity up to 91% with no phosphorus content. The silica from palm oil waste for futher processing into silicon has high pottential to be developed as a raw material in solar cell technology.

Climate change, mitigation, palm oil waste, solar cell

EO-12

The characteristic of chemical LMO solution of shrimp shell wastes, fish wastes, water hyacinth and its application to empty fruit bunch of palm oil compost

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The aim of this research was to analyze the effect of (Liquid Microorganism, LMO) and the different concentration of chemical LMO solution produced from shrimp shell wastes, fish wastes and water hyacinth to the chemical content of empty fruit bunch of oil palm compost. This research was conducted for four months in Soil Laboratory, Faculty Agriculture, Mulawarman University, Samarinda, East Kalimantan. LMO was produced for 14 days and the compost was produced 1 month. The quality and chemical analysis of the compost were analyzed for pH, Organic C, N Total, C/N Ratio, P Total, and K. Based

on the result, the adding of LMO using shrimp shell waste, fish wastes and water hyacinth to empty fruit bunch of palm oil compost could enhance the its nutrient and chemical composition. By giving LMO solution of fish wastes to empty fruit bunch of palm oil compost increased the pH to the highest level which was 8.19 in K2 treatment. Organic C appeared down to the lowest level which was 31.52% shown by K3 treatment. P Total was increased to the highest level of P total which was 0.32 shown by K2 treatment. K total was increased to 3.19 as shown by K2 treatment. Unless for the N Total was decreased compared to the control treatment, but this value was the best nutrient among the other treatments. All of the treatments contained cellulolytic and lignolytic microbials, and the best compost was made from the highest dosage of microbial solution (400 mL starter of LMO/liter solution).

Compost, empty fruit bunch, local microorganism, nutrient analysis, palm oil

EO-13

The respiration rate, sugar and acid content of some tropical fruits and vegetables during modified atmosphere storage

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Some of fruits (Pondoh salak and Raja banana) and vegetables (red chilly and eggplant) were stored within the modified atmosphere containers at room temperature to know each respiration rate, sugar and acid contents. The respiration rate of the chilly, Pondoh salak, Raja banana and eggplant which stored at O_2:CO_2:N_2=20:5:75 at room temperature were 40.96, 17.05, 21.56 and 38.58 mg/kg/h, respectively. The sugar content (oBrix) of all of fruits and vegetables at preliminary of storage was decreased at second day of storage, than it was increased until the last storage, except Raja banana that at second day showed little climacteric activities. The sugar content of chilly was 12.2 to 15.6, Pondoh salak was 10.0 to 15.4, banana Raja was 12.0 to 13.6 and eggplant was 12.4 to 14.0 oBrix. The acid content (% v/v) of chilly, Pondoh salak and eggplant were 0.56-0.66, 0.28-0.42 and 0.19-0.31%, respectively. Whereas, the acid content of Raja banana tended to fluctuate as climacteric activities that was about 0.38-0.67% then tended to decrease to 0.46% at the sixth day.

Acid content, modified atmosphere, respiration, sugar

EO-14

Nutrient content of golden snail, cow manure, bamboo root, and banana peel local microorganism as a standardized nutritious organic liquid fertilizer

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Local microorganism is a fermented solution derived from remnants of decay and it is easy to biodegrade. The low cost of generating LMO becomes the advantages to produce it. LMO solution contains potential bacteria, macro and micro nutrient in organic material. LMO can be used as an organic liquid fertilizer for farmers to reduce the use of chemical fertilizer. Unfortunately, there are still limited researches to investigate the local microorganism. Therefore, we were interested to test the efficiency of LMO application to the organic farming systems. The objective of this experiment was to determine the nutrient content of Local Microorganism (LMO). The LMO derived from golden snail, cow manure, bamboo root, and banana peel was analyzed Soil Laboratory, Faculty of Agriculture, Mulawarman University from March to July, 2015. The result showed that the nutrient content of golden snail LMO was pH 6.11, C organic 1.39%, total nitrogen 0.15%, C/N ratio 9, total phosphorus 0.10%, total Kalium 0.15%, and total Calcium 1.06%. These nutrients content was the biggest among the LMO from other raw materials. Meanwhile, in the LMO derived from cow manure, the nutrient content was pH 4.66, C organic 0.75%, total nitrogen 0.33%, C/N ratio 24, total of phosphorus 0.09%, total Kalium 0.15%, and total calcium 0.74%. All local microorganisms contained cellulotic dan lignolitic bacteria, and only LMO derived from golden snail had a lignolitic fungi. The isolated golden snail microorganism were *Aspergillus niger*, *Penicillium* sp., and *Trichoderma* sp., and the isolated banana peel and cow manure microorganism were *Aspergillus niger* and *Penicillium* sp., as well as *Aspergillus* sp. was isolated from bamboo root.

LMO, local microorganis, organic liquid fertilizer, nutrient

EO-15

Land reclamation of coal post-mining to increase the productivity in Kutai Kartanegara, East Kalimantan

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Coal mining in the Kutai Kartanegara District, East Kalimantan is the utilization of natural resources that can not be renewed (unrenewable resources). Coal mining openly has negative impacts on the decline of the quality of

land, such as changes in the landscape (nature), damage to pipes capillaries and permeability of the soil, lack of water storage, and decreasing quality of the soil so that the reclamation of post-mining land is really become a very important strategy to increase their productivity. The purpose of this study was to improve the quality of post-mining land in order to be utilized as productive land with various reclamation activities. Studies conducted from May to August 2014 in Kutai Kartanegara covered five sub-districts samples from three zones territory (coastal zones, middle, and upper). The analytical method used was the laboratory analysis and descriptive analysis. The results showed that the post-mining land reclamation should be done starting from the pre-construction, construction, operation until after the mine operation. In the pre-construction phase, reclamation efforts through land acquisition with a lease of land to the land owner occurs faster than the land quality improvement of land acquisition systems replace broken because the company is required to improve the condition of land to become productive. At this stage of construction, reclamation efforts with the open land without burning (zero burning) and biomass processing result of clearing land into organic fertilizer accelerate the improvement of land quality. Then in the operating phase, top soil and ground cover (sub-soil) is returned to its original position (pre-mining) and continued with the activities revegetation by enriching the soil by adding organic fertilizer and integrated agriculture through the integration of livestock with productive plants and strongly supports the economic value of land quality improvement. Furthermore, at the stage of post-surgery follow-up reclamation activities conducted at least three years of post-mining can improve the condition of the plant so that the land becomes productive.

Post-mining land, productive land, reclamation

EO-16

Potential fast growing species from plantation forest as raw material for bioethanol production

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Lignocelluloses biomass is an organic residue which consists of mainly cellulose, lignin and hemicelluloses, whose basic units are sugars that can be fermented into ethanol or other chemicals. These structural materials are produce by plants to form the cell walls, leaves, stems, stalks, and woody portions of the plant. Lignocellulosic materials are regarded as an alternative energy source for bioethanol production to reduce our reliance on fossil fuels. Ethanol is a promising alternative fuel which can be produced biologically from a variety of feedstock and waste. The alkaline pretreatment were carried out using sodium hydroxide solution and Kraft pulping. The chemical components (lignin, holocellulose and α-cellulose) before and after pretreatment were investigated in this study to determine the potential utilization for bioethanol feedstock. The result showed that fast growing species from plantation forest as a second generation feedstock for bioethanol production had good potential to be used.

Alkaline pretreatment, bioethanol, chemical components, fast growing species

EO-17

Potency of bioarang briquette with materials from cassava peels and slugge of wastewater treatment plant

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The purpose of this study was to determine the quality of bioarang briquette with materials from cassava peels and sludge of wastewater treatment plant. The first, bioarang briquette analized stability test and compressive strength. Then, bioarang briquette with best value analyzed for parameter including moisture content, ash content, calorific content, and burned test. The result briquette quality based on compressive strength for bioarang briquettes carbonated water content between 3.8-4.5% and non-carbonated bioarang briquettes between 5.2-7.6%. Bioarang carbonation briquette ash content was between 5.30-7.40% and non-carbonated was between 6.86-7.46%. Bioarang carbonation levels briquettes heated between 578.2-1837.7 calories/g and non carbonated was between 858.1-891.1 calories/g. Carbonated bioarang burned test was between 48-63 minutes and non-carbonated bioarang was between 22-42 minutes. Emissions resulted from the bioarang briquettes for carbonated and non carbonated composition according to the government regulations ESDM No. 047 of 2006 were 128 mg/Nm^3 and 139 mg/Nm^3.

Bioarang briquette, leather cassava, sludge, wastewater treatment plant

EO-18

Genetic diversity analysis of local rice cultivars in Penajam Paser Utara and Paser Districts in East Kalimantan and identification of its genetic potency

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Changes to biodiversity currently underway more rapid, and have led to degradation in many species including rice. The amount of genetic diversity loss is poorly known since most of the genetic resources have not been well recorded. Less is known about rice genetic diversity in East Kalimantan, because their existence only depends on traditional cultivation and conservation by local farmers based on needs and tendencies towards certain varieties. According to the current exploration study conducted in Penajam Paser Utara and Paser, there were high genetic diversities existing in those two districts. As many as 71 local rice cultivars were collected, consisted of 53 rice and 18 glutinous rice. Pre-identification of their genetic potencies showed some superior and potential traits which are useful for rice breeding programs for the assembling of new superior rice varieties. Genetic diversity analysis based on morphological traits clustered the varieties in several classes according to their similarities degree.

East Kalimantan, genetic diversity, genetic potency, rice

EO-19

Nutritional optimation for *Chlorella* and *Dunaliella* mass culture

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Chlorella and *Dunaliella* was carotenogenic producing microalgae. Optimal of algal growth depend on nutrient quantity and quality instead of some others factors like light, pH, turbulence, salinity and temperature. The main nutrients consist of macronutrients include nitrate, phosphate, and trace metal, followed micronutrients and vitamin. The objective of the research was searching the optimal media for growth of *Chlorella* and *Dunaliella* in mass culture. The research was conducted by application of three different modification media Walne, modification of Walne and NPK (16:16:16) on *Chlorella* and *Dunaliella* cultivation. The research result showed the highest density with of 2.3 x 10^7 cell/mL was reached on modification of Walne Media.

Chlorella, *Dunaliella*, growth, microalgae, nutrient

EO-20

Wood decay evaluation of *Macaranga gigantea* and *Macaranga tanarius* against *Trametes* sp. fungus

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Tree species is one of the most important factors determining the natural resistance of wood products towards microorganism interferences. It has been known that fast growing trees commonly produce weak wood and not resistant against fungal decay. In this study, wood decay resistance of two species of fast growing trees, i.e *Macaranga gigantea* and *Macaranga tanarius* against a white rot decay fungus (*Trametes* sp.) were evaluated. A thirty six-week decay test was performed with 20 x 20 x 10 mm (radial x tangential x longitudinal) wood blocks in petri dishes. Decay resistance judged by wood weight loss and microscopic appearance of wood cell degradation. Results showed that *M. tanarius* wood was more resistant than *M. gigantea* wood from decay by *Trametes* sp. with 8.01% and 31.94% of weight loss, respectively. Light microscopy clearly revealed the fungal hyphae penetrate into cell walls and their proliferation and colonization in the cell lumina, as well as the ability of this fungus to degrade several wood cells of both wood species; however cell wall degradation of *M. gigantea* was more severe than that of *M. tanarius.*

Macaranga gigantea, *Macaranga tanarius*, natural resistance, Trametes, wood decay

EO-21

Improving the ex-coal mining land due to Boron deficiency problem to increase land productivity in East Kalimantan

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Boron deficiency is a major problem in lands of deforestation, mining and degraded land due to the leaching process by rainwater or water flow. Utilization of such degraded lands for crop cultivation, plantations and forestry is facing problem of low boron nutrient content in the soil. The experiment was conducted using ex-mining soil of one and two years pasca reclamation, from two differnt ex-coal mining sites in East Kalimantan. Boron fertilizer (Borate 48) was applied at different concentrations of 0 ppm, 40 ppm, 80 ppm and 120 ppm. The effet of boron fertilizer in improving ex-coal mining soil was evaluated using two different plant types,

groundnut (*Arachis hypogaea*) and palm oil (*Elaeis guineensis*) (at nursery stage of 6 month old plant). Results showed that boron fertilizer application gave a significant effect to relative grwth rate (RGR), Net Asimilation Rate (NAR), plant biomass in groundnut. On the otherhand, boron fertilizer did not give a significant effect to the palm oil growth.

Boron deficiency, ex-coal mining soil, Boron fertilizer

EO-22

Increasing of genetic variation of rice (*Oryza sativa*) by Gamma Ray radiation

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Rice is the source of important food in the world. The demands of rice tend to increase every year. Research to increase genetic variation of rice by gamma ray radiation has been conducted. This research objective was to study the influence of gamma ray radiation doses on the vegetative growth, yield and quality. Research used randomized completely block design factorial consists of 2 factors that were gamma ray radiation doses and varieties. Rice varieties were ciherang and cempo ireng, while doses of gamma ray radiation consist of 6 levels that were: 0, 100, 200, 300, 400 and 500 gray. Data analyzed with manner analysis and Duncan's multiple range test (DMRT) level 5%. The result of research indicated that gamma ray radiation 200 gray to ciherang could improve the number of grain/panicle and protein rate and also degraded plant height and amilosa. Gamma ray radiation to cempo ireng dose of 200 gray could improve the number of grain/panicle and weight of 1000 grain and also decreasing day to 50% of flowering and harvesting time.

Gamma radiation, genetic variation, protein, rice

EO-23

Water quality improvement of nile tilapia and catfish polyculture in aquaphonic system

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Research on the improvement of polyculture water quality in aquaphonic system was conducted in July 2014 to August 2014. This study aims to improve the water quality in nile tilapia and catfish polyculture by applying aquaphonic system. The results showed that some water quality parameters were increased. Water quality parameters such as dissolved oxygen, ammonia, and nitrate were increased, meanwhile orthophosphate tend to be similiar on aquaphonic system and control. The study was conducted experimentally by using completely randomized design. Dipolikultur fish is catfish and tilapia, while the water tanamana are planted spinach and lettuce. At the end of the study period the concentration of dissolved oxygen in the aquaphonic system ranged from 5.3 to 7.6 mg/L, while the media control cultivation without aquatic plants ranged 4.2-4.3 mg/L. Average concentration of ammonia, nitrate and orthophosphate in the aquaphonic system ranged from 0.003 to 0.25 mg/L, 10.0 to 50.7 mg/L and 3.0 mg/L-5.0 mg/L respectively. Meanwhile, in media control cultivation concentration of those three parameters are 0.003 to 0.35 mg/L, 10.0 to 60.0 mg/L and 3.0-5.0 mg/L respectively. Based on this study concluded that the polyculture water quality can be improved through the application of the aquaphonic system

polyculture, aquaphonic, tilapia, catfish

EO-24

Average daily gain of tilapia (*Oreochromis niloticus*) fed with fermented *Lemna* sp. meal

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The aim of this research was to determine the highest levels of *Lemna* sp. Fermented Meal (LFM) on artificial diet toward the growth rate of tilapia.This research was conducted from June to September 2015 including 42 day observation. The design used in this research is an experimental method with Completely Randomized Design (CRD) that consist of 4 treatments and 3 repetitions, the treatment A (O% LFM), treatment B (20% LFM), treatment C (30% LFM), and treatment D (40% LFM). The parameters observed in this research divided into five parameters, Daily Growth Rate (DGR), Feed Conversion Ratio (FCR), Survival Rate (SR), Nutrition differences in *Lemna* meal, and water quality. Results of the proximate analysis states that *Lemna* fermented Meal using Effective Microorganism 4 (EM4) is change the nutrition content, The crude protein in *Lemna* meal increased by 5.6% after the fermentation process, the crude fiber content decreased by 15.27% and the crude fat content increased by 5,76%. *Lemna* fermented Meal (LFM) application up to 40% in commercial diet produced, ADG between 0.20-0.50% and SR between 70-80%. Application of 40% *Lemna* Fermented Meal (LFM) in commercial diet product produced the highest level of ADG is 0.50%.

ADG, EM4, fermentation, lemna meal, tilapia fry

EO-25

The effect of biochar, cocopeat and saw dust compost on the growth of two dipterocarps seedlings

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Ideal growing media should contain enough nutrients, light textured, and ability to hold water in order to create conditions that can support plant growth. The growing media used for propagation has several requirements, such as: firm and dense in order to enhance the growth of stems, has a water holding capacity, ensure the plant life, and moderate humidy. The objective of this study is to evaluate the effect of biochar, coco peat, and saw dust compost on the growth of seedlings of *Dryobalanops aromatica* and *Shorea balangeran*. Experiment was conducted by completely randomized block design (CRBD) in factorial with two factors, namely growing media (top soil 100%; top soil 80% + saw dust compost 20%; top soil 80% + biochar 20%, top soil 80% + 20% coco peat) and two species of dipterocarps seedlings (*D. aromatica* and *S. balangeran*). The experiment was conducted in the nursery of the Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan for three months. To determine the best growing media, vegetative parameters of seedlings were measured and the data were statistically analyzed. Survival rates of both of seedlings showed good specification in all types of growing media. The survival rates of D. aromatica for A0 A1, A2, A3 that is 100%; 100%; 97.78% and 97.78%; respectively. S. balangeran are 93.33%; 100%; 100%; 97.78%. Quality Index of *D. aromatica* for A0, A1, A2, A3 is 0.15; 0.14; 0.10; and 0.10 respectively. For *S. balangeran* is 0.09; 0.38; 0.05 and 0.07 respectively.

Biochar, cocopeat, growing media, growth response, saw dust compost

EO-26

The growth of *Shorea leprosula* in the nursery site using post-mining soil mixed with biochar of palm-oil waste

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Shorea leprosula is one species of the Dipterocarp which can grow in a wide variety of site conditions. We try to plant *S. leprosula* as a revegetation species in post-mining land. But for the first step, we only plant this species on the polybag in the nursery, using post-mining soil mixed with biochar of palm-oil waste. This study aims to analyze the sapling growth of *S. leprosula* on the soil combination of post-mining soil and biochar with different doses, and to determine the best doses of biochar as a soil conditioner that can be used on the post-mining land. This research was conducted in Nursery Site of Forestry Faculty, the Mulawarman University, Samarinda, East Kalimantan from May to September 2015. We used Completely Randomized Design (CRD) in this study, using 3 factors of soil combination, i.e. A0 (100% post-mining soil), A1 (60% post-mining soil, 20% biochar of palm-oil waste, and 20% organic fertilizer), and A2 (50% post-mining soil, 30% biochar of palm-oil waste, and 20% organic fertilizer). The result of research showed that *S. leprosula* which is planted in A2 soil combination (50% post-mining soil, 30% biochar of palm-oil waste, and 20% organic fertilizer) has the highest plant life percentage of all soil combination. Statistical analysis showed that combination of post-mining soil and biochar gave a significant effect to the growth (increment of diameter) of *S. leprosula*. This study showed that the best soil combination which can be used to increase the growth of *S. leprosula* as a revegetation species in post-mining land is A2 (50% post-mining soil, 30% biochar of palm-oil waste, and 20% organic fertilizer).

biochar, growth, palm-oil waste, post-mining soil, *Shorea leprosula*

EO-27

Nutritional content and growth performance Tubifex cultured with different animal wastes and probiotic bacteria

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During this time, the existence of sludge worm still relies on collection of nature. Media of culture is an important factor for the growth and the quality of nutrient. The purpose of this study is to find the best media of culture used different animal wastes fermented by probiotic bacteria to increased nutrient content and the growth of *Tubifex*. This study was conducted using completely randomized experimental design with 10 treatments and three replicates. Those media used different animal manures such as quail dung, goat dong and chicken dung mixed unsold bread and tofu waste fermented by probiotic bacteria and then cultured for 50 days. The results showed

that the media used 50 g/L quail dung, 50 g/L tofu waste and 100g/L unsold bread created the highest biomass production, population and nutrition content of *Tubifex*. There are 242306.16 individual/L for population; 172.19 g/for biomass production, and 66.26% protein content. The higest fatty acid profile is 17.52% of palmatic, 27.26% of oleic and 7.25% of linoleic and the highest essential amino acid is 3.63% of lysin. In general, the content of ammonia, DO, temperature, and pH during the study were in the good range of the life of *Tubifex*. This research showed that media used 50g/L quail dung, 50 g/L tofu waste and 100g/L unsold bread created the highest biomass production, population and nutrition content of *Tubifex*.

Animal wastes, bacteria probiotic, cultured, nutritional, tubifex

EO-28

Growth performance, survival and biomass production of Vanname larva fed *Artemia* sp. local product fresh, frozen and preserves

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Artemia is one of the best available live food for larvae of shrimp (*Litopenaeus vannamei*), it is due to *Artemia* has a good nutrient for larvae of shrimp. The purpose of this study is to determine the performance of growth, survival rate, and biomass of shrimp larvae fed with fresh, frozen and preserves *Artemia* sp. local products. Tested animals that used were larvae of shrimp with average stages PL1-PL 10, this study was conducted by using completely randomized experimental design with three treatments and three replicates. The results showed that there were significant effects (P<0,05) on growth of shrimp larvae fed by fresh *Artemia* sp. local products is the best treatment with 12.84 cm for growth and showed that there were significant effects (P<0,05) on biomass of shrimp larvae fed by fresh *Artemia* sp. local products 6.93 gr and 97.62% for highest survival rate of shrimp larvae fed by fresh *Artemia* sp. local products. This research showed that the highest growth performance, survival rate and biomass shrimp larvae fed *Artemia* sp. fresh local product.

Biomass, local *Artemia*, performance of growth, survival rate, vannamei larvae

EO-29

Seminal plasma and spermatozoa characteristics of Nunukan Rooster

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The objective of this study was to caracterize the seminal plasma and spermatozoa of the Nunukan rooster (*Gallus domesticus*). Five roosters were used in this study. Semen was collected twice a week by dorso-abdominal massage method. The semen was evaluated for volume, concentration, motility, live/dead ratio, and percentage abnormalities. The semen was white-white milk in color, spermin in smell, and thick in concistency. The semen had a pH of 7.2±0.1. The mean values for volume was 0.21±0.15 mL, sperm concentration was 3.68±0.53x 109 sperm/mL, percentage of sperm motility was 80.00±0.50%, percentage of live sperm was 82.55±16.51%, percentage of abnormal spermatozoa was 18.20±10.40%. The seminal plasma in 100 mL contained 2.1 g protein, 4 mg fructose, 8 mg sorbitol, 319 mg sodium, 60 mg potassium, 8 mg calcium, 12 mg magnesium, and 138 mg chloride. These values were relatively the same when compared to other domestic roosters and suggested to be related with age and sexual maturity of the rooster and the environment.

Nunukan rooster, seminal plasma, spermatozoa

EO-30

Formula development of mangosteen (*Garcinia mangostana*) pericarp ethanolic extract into anti dandruff shampo dosage

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Hair problem that often occurs is that dandruff is caused by the fungus *Malassezia furfur*. Treatment of dandruff problem can be overcome by using anti-dandruff shampoo containing zinc pyrithione. Traditional medicines from nature are also often used as anti-dandruff community, one of which is the mangosteen pericarp have antifungal effect. This research aims to develop an anti-dandruff shampoo dosage form to the growth of the fungus *M. furfur* from mangosteen pericarp extract. Type of research is experimental. The research object is the mangosteen (*Garcinia mangostana*) pericarp extracts were prepared by maceration using ethanol 95%, further formulated in a shampoo preparation with extracts concentration variation of 80%, 90% and 100%. Testing preparations shampoo carried out on organoleptic (shape, color, smell), pH, high foam, viscosity, specific gravity, the dispersion of dirt, cleaning ability, the security preparations, analysis of

alkali-free, moisture content, emulsion stability and power antifungal shampoo with disc diffusion method (Kirby-Bauer). Data were analyzed using one-way ANOVA analysis using SPSS for Windows version 20.0 with a significance level of 5% ($p \leq 0.05$). Based on this study it can be concluded that the extract of the Mangosteen pericarp can be formulated into dosage forms anti-dandruff shampoo. The test results antifungal shampoo anti-dandruff preparations mangosteen peel extract 80%, 90% and 100% demonstrated efficacy in the growth of the fungus *M. furfur* mengambat the diameter of the inhibition values respectively, are 8.28 mm, 9.27 mm and 11.36 mm. Preparations shampoo that meets the requirements of the physical stability during 4 weeks of storage is a formula with a concentration of the Mangosteen pericarp ethanolic extract 90% and 100% covering organoleptic test, pH, high foam, viscosity, specific gravity, the dispersion of dirt, cleaning ability, the security preparations, analysis of alkali-free, moisture content and stability of the emulsion.

Shampoo, dandruff, *Garcinia mangostana*, Kirby-Bauer, *Malassezia furfur*

EO-31

Utilization of cassava (*Manihot utillisima*) skin and prawn shells as bioplastic material

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Bioplastic materials are very useful for remediation of pollution in the environment by non-degradable plastics. Amylum or starch, as the building block of bioplastic materials, can be obtained from the skin of the cassava (*Manihot utillisima*). Chitosan as a filler can be obtained from prawn shells. Both are often considered waste and are found to be in abundance in households and food industry. This research was aimed at obtaining bioplastic from cassava skin and prawn shells. Bioplastic was produced by mixing the starch from cassava (red and white), chitosan from prawn shells, and glycerol. The bioplastic was characterized using DSC, FTIR, SEM, WVTR, and biodegradability test. The biodegradability test was conducted by keeping the bioplastic buried in the soil for five days, observed every 24-hour. DSC results showed a chemical bond forming between the starch and the chitosan, and FTIR results showed the presence of unsaturated hydrocarbon bonds, such as amines. SEM analysis found that the bioplastic's surface was homogenous, poreless and without cracks. WVTR showed that the bioplastic meet the requirements to be used as sausage wrapper. The bioplastic was completely biodegraded by the fifth day. As a comparison, the synthetic bioplastic had not yet been completely biodegraded by the fifth day. The bioplastic from the starch of white cassava skin was better than that of the red cassava skin, based on the results of the FTIR, SEM, WVTR, and characterizations.

Bioplastic, chitosan, biodegradability

EO-32

Phytochemicals analysis and antimicrobial properties of *Shorea leprosula* (Dipterocarpaceae)

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This study aims to investigation the antibacterial bioactive substances found in crude extracts of leaves and bark of red meranti (*Shorea leprosula* Miq.) against *Staphylococcus aureus* and *Escherichia coli*. Plant materials were taken from the Botanical Garden Forest University Mulawarman, of Lempake, Samarinda, East Kalimantan. Test the antibacterial properties using paper disc diffusion method of Kirby-Bauer. The GCMS study demonstrated that the presence of different types of compounds were 2-Benzenedicarboxylic acid(65.77%), Eicosanoic acid (9.82%), 2,Pentadecenone 6.53%), Tricosane (5.86%), Hexanedioic acid (4.13%) in leaf, while in the bark shown the compounds of 1.2-Benzenedicarboxylic acid(33.27%), stigmas-5-en-3-ol (21.67%), Hexadecanoic acid,methyl ester (13.16%, 1,2,3-Benzenetriol (6,98%) and Hexadecanoic acid (5.78%). Ethanol crude extract of leaves of red meranti showed strong antibacterial properties in the category with inhibition zone between 13.12 mm sd 15.56 mm and 16.44 mm against *S.aureus* s.d. 15.5 mm against E.coli.Ethanol crude extract of the bark at a concentration of 3.75% indicates strong category antibacterial properties against both types of bacteria are equivalent chloramphenicol synthetic antimicrobial drugs

Red Meranti (*Shorea leprosula* Miq), Phytochemical Analysis, antibacterial properties

EO-33

Search for biological activities from an invasive shrub species rose myrtle (*Rhodomyrtus tomentosa*)

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Research into the potential of diversity, ethnobotany and ethnopharmacology and bioactivity of Indonesian plants is essential. Comprehensive and continuous scientific

research is indispensable. In this paper, a research aimed to evaluate biological activities of an invasive shrub plant in Kalimantan, rose myrtle or masisin (*Rhodomyrtus tomentosa*) is reported. In traditional manner, the plant was used to treat stomachache, diarrhea, bleeding, mouth ulcer and skin infection. In continuation of our search into biologically-active substances from plant sources, the ethanol and aqueous extracts of fruit, leaves, twig and stem of *R. tomentosa* were evaluated their antimicrobial and antioxidant properties and toxicity. Antimicrobial activity was examined by agar well diffusion against *Salmonella thypy* and *Baccillus cereus*. Antioxidant property was evaluated by DPPH free radical scavenging activity. Toxicity of the plant was determined by brine shrimp lethality test. The results showed that ethanolic and aqueous extracts possessed good antioxidant activity by inhibiting more than 50% of the DPPH radical formation at the tested concentration that is comparable to the ascorbic acid. The strongest antimicrobial activity was displayed by the ethanol extract of the fruit by inhibiting more than 50% of *S. thypi* and *B. cereus* growth by relative comparison to terramycin. The fruit ethanol extract possessed toxicity against *Artemia salina* cyst with LD_{50} lower than 25 ppm, while no toxicity appeared from the aqueous extract. The results displayed potential of further uses of *R. tomentosa* based on its biological activities.

Biodiversity, biological activities, masisin, phytochemicals, *Rhodomyrtus tomentosa*

EO-34

Relationship between body length and dry weight of soil fauna as an ecosystem engineers in smallholder cocoa plantation

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Soil fauna as ecosystem engineers are playing an important role in soil quality modifying and structuring of soil fauna food web. Dry weight of the soil fauna taxa is an important parameter to calculate decomposition and nitrogen mineralization rate through soil food web in agro-ecosystem. The dry weight could be estimated through the body length. Model of the relationship between the lengths of the body with a dry weight of soil fauna can vary according to the external morphology of the taxa and soil environment. The objective of this study is to analyze the model of the relationship between the lengths of body with a dry weight that is appropriate for a taxon of soil fauna from an ecosystem engineers group in smallholder cocoa plantation. Each taxon has been removed from the soil using hand sorting techniques. In this study have found out soil fauna as ecosystem engineers are ants, termites, earthworms and millipedes. Ants, termites and earthworms have been identified up to the subfamily level, while millipedes up to the subclass level. Subfamily in groups of ants have found out are Dolichoderinae, Ponerinae, Myrmicinae and Formicinae. Termite is Coptotermitinae and Macrotermitinae, and earthworm is Glossoscolecidae. For millipedes is Diplopod subclass. Each individual from each taxon measured body length and weighed dry weight. Four models of the relationship including linear model, power models, logarithmic models and exponential models were tested. The result was shown that power models suitable for Ponerinae and Glossoscolecidae, logarithmic models for Dolichodeinae and Macrotermitinae, exponential models for Diplopod and Myrmicinae, and linear models for Coptotermitinae and Formicinae.

Relationship model, suitable, taxonomic level

EO-35

Effects of administration of 'Pinang Yaki' (*Areca vestiaria*) extract on the quality of spermatozoa of male rats

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One of the alternatives for male contraception is using natural substances including the ones from plants according to Indonesian Act no. 23, 1992, regarding traditional medicine. As an archipelagic country, Indonesia has tropical rain forests that are rich with flora species. In the efforts to search for ideal contraception for male, a number of criteria should be met, including prevent fertilization, safety, reversible, responsive, simple to use, and have no side effects. 'Pinang yaki' (*Areca vestiaria* Giseke) has been used to cure diabetes and as contraception by the community who reside around Bogani Nani Wartabone National Park, northern Sulawesi. To be used as medicine, the seeds are cracked open to remove the meat, than it is boiled with a glass of water, and finally the liquid is drank when it is cool. The objectives of this study were to undertake a preclinical test of 'pinang yaki' as an anti-fertility agent, to investigate the effects of 'pinang yaki' seed extract administration on the quality of spermatozoa of albino male Sprague-Dawley, and to determine the effective doses for decreasing the quality of rat spermatozoa. It is hoped that this research will lead to a new invention to support the WHO program that is to find new methods for male contraception that meet criteria such as safe, effective, reversible, and have no side effects. From the results obtained from this research it is concluded that administration of 'pinang yaki' seed extract on male rats is able to decrease motility, normal shape of spermatozoa, and the number of spermatozoa number.

Pinang yaki extract, spermatozoa, male rats

EO-36

Isolation and identification phenolic compound from *Anacardium occidentale* leaf extract

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Indonesia has the highest biodiversity in the world especially for plant's species used as herbal medicine. *Anacardium occidentale* (cashew) is a tropical plant which used as traditional medicine in Indonesia. The previous studies reported some isolated compound and bioactivity from *A. occidentale*. Study about antioxidant is needed because many diseases caused by free radical. *A. occidentale* constituents such as tannin and phenolic compound can be used for alternative source as antioxidant compound. In the present study, cashew leaves extracted using methanol. The extract fractionated using gravitation column chromatography. The fractions which have same Rf value will be combined for further fractionation to yield pure compound. The chemical structure of isolated compounds will be determined by using UV, IR, H-NMR, and C-NMR spectroscopy. The results of research showed yellow powder phenolic compound, with melting point 247-248°C. Antioxidant activity (IC_{50}) from the isolated compound is 191.815 ± 1.07 µg/mL and positive control (ascorbic acid) 5.26 ± 0.74 µg/mL. This study concluded that the isolated compound has potentials as antioxidant.

Anacardium occidentale, antioxidant, cashew, DPPH

EO-37

Compression perpendicular to grain of three wood species

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Borneo has many wood species that could be a structural material. As structural material, compression perpendicular to grain is required to determine before using, especially wood as railways sleepers. The objectives of this research are to determine compression perpendicular to grain of Bangkirai (*Shorea laevis* Ridl), Medang tanduk (*Nothaphobe ceratoxylon* Kosterm. Spec. Inert) and Kenanga (*Canangium odoratum* Baill), to analyze the difference between radial and tangensial direction of testing load and to know the possibility of these wood as railways sleepers material based on SNI 7900.1:2013. Determination compression perpendicular to grain conducted according to ASTM 143-94 (2000) when reach 1 mm and 2.5 mm deformations. The average of compression perpendicular to grain at 1 mm deformation of Bangkirai is 127.2 kg/cm^2, Medang tanduk is 68.7 kg/cm^2 and Kenanga 66.9 kg/cm^2 for tangensial direction and 161.2 kg/cm^2, 82.7 kg/cm^2 and 96.0 kg/cm^2 for radial direction. Whereas for 2.5 mm deformation of tangensial are 170.1 kg/cm^2, 83.8 kg/cm^2 and 87.3 kg/cm^2 as well as for radial are 202.6 kg/cm^2, 98.4 kg/cm^2 and 113.1 kg/cm^2 for Bangkirai, Medang tanduk and Kenanga respectively. Statistically, tangensial and radial load direction has significant difference (1% propability) for these wood species. In conclusion, Bangkirai has higher compression perpendicular to grain value than Medang tanduk and Kenanga. Radial load direction better than tangensial one. Radial direction of 2.5 mm deformation of these species is fullfill the SNI 7900.1:2013 requirement as railways sleepers material. According to SNI 7900.1:2013, the minimum compression perpendicular to grain of wood as railways sleepers is 92.0 kg/cm^2 at 2.5 mm of deformation.

compression, perpendicular, deformation, railways sleepers

EO-38

The enhancement in comprehension for the younger generation of school age in conducting biodiversity conservation in Harapan Island and Tidung Island, Seribu Islands

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Natural potential of the sea has been utilized extensively through the exploration and exploitation activities, which can lead to the degradation of marine ecosystem and biodiversity quickly. The wise use along with sustainability conservation has begun with awareness for keeping marine life, which is should been developed since early age. Therefore, it is necessary to be given marine environment education and the conservation effort in the group of school age generation. The objective from this research is to determine the level of understanding for school age generation having given an education and training in marine environment, in doing the biodiversity conservation in their neighborhood. This research is using comparison methods toward the island is close to Jakarta and has long been a tourist location, with the island being in the Northern part of the Seribu Islands and newly developed as a tourist site. The education and training encompass the observation activity for coral reef using Coral Health Chart method, seagrass condition observation through Seagrass Watch method, and introduction in mangrove ecosystem. The result activity indicated the level of understanding from cognitive abilities in those two locations have

increased by 75%, affective ability increased sharply in the island which is become tourist destination, whereas in the newly developed island that is being a tourist a large increase occurred in psychomotor abilities. The conclusion for this program is managed to improve understanding and ability to act for younger generation in environmental conservation and marine and coastal biodiversity.

Conservation, education, marine environmental, Seribu Islands, level of understanding, younger generation

EO-39

Popimorphism mannose binding lection of Indonesian origin

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Mannose binding lectin (MBL) protein plays a role in the activation of the lectin pathway of complement so that the protein acts as a Pattern Recognition Receptor for dengue virus envelop. Levels of MBL protein have a high variation so that there is no normal limit on the levels of MBL protein. In this study wants to know polimorphism and haplotipe of MBL. The study was conducted with a cross-sectional method. The results of this study showed MBL gene polymorphism forms of Indonesian origin of type XL, XH, YL, YH.

Polimorphism Mannose Binding Lectin, Indonesian people and Lectin Pathway.

EP-01

Evaluation of antioxidant activity as a function of the genetic diversity of *Canna indica* complex (Cannaceae)

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Canna indica complex is a prominent section of tropical and subtropical areas where it is indigenous, and the Southeast Asian where they have been introduced. At present *C. indica* complex comprised over hundred hybrids which are used as cultivated commercial horticulture. The species complex contains starchy rhizome having economic importance in terms of food and herbal medicine. In addition, the bright color of the flower makes its valuable ornamental plant and a potential source for extraction of natural colorants for dyeing different sort of purpose. The aim of the study is to assess genetic diversity of four varieties of *C. indica* complex based on SRAP (sequence-related amplified polymorphism) and iPBS (inter primer binding site) markers and to examine correlation of phytochemical characteristics and antioxidative properties of flowers extraction of four different color varieties. The results showed that despite genetic diversification, phytochemical characteristics and antioxidative properties of flowers were not variable. Moreover, this is the first report of using SRAP and iPBS markers as a tool for determining genetic variation in *Canna* species as well as first statement on the phytochemicals and antioxidant activity from *Canna* flowers particularly for its radical scavenging activity and can be a good source of cosmetic additives.

Antioxidant activity, *Canna indica*, genetic diversity, iPBS, SRAP

EP-02

The use of water plants in South Kalimantan as lowering salinity water levels consumption

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Water is natural resources that is essential for life all living things. The problems frequently facing were the limited to get clean water especially during dry season. One of the problems facing is high levels of salt (salinity) in most water consumption as a result of sea water intrusion. The objective of this research was to study the utilization of plants found on aquatic land or swamp land in the region of South Kalimantan to reduce salt content which is found in raw water sources public consumption which processed on installation of clean water. Plants were used among others are water hyacinth (*Eichhornia crassipes*), kiambang (*Salvinia molesta*), kayu apu (*Pistia stratiotes*) and Chinese water chestnut (*Eleocharis dulcis*). Research conducted using completely random design (CRD) by putting fourth plants each on a container that has been given of salt solutions by concentration 1% (equivalent to 10,000 ppm) with the time observation for 7 days, 14 days and 21 days for know the levels of salt that can be absorbed and its effect on plants. Data analyzed using anova and tested further using DMRT on 5% standard. The result showed that all water plants used able to absorb salt in a solution and reduce salinity different levels the salt absorption. The content of salts that are tested differed between the tops of the plant (shoot: the stalks and leaves) with the roots of where the concentration of salt in the root is larger. Testing shows levels of salt show you up to 21 days with observation, the absorption of levels of salts upon Chinese water chestnut, water hyacinth, kayu apu and kiambang are: 5400 ppm (root) and 2400 (shoot), 5216 ppm (root) and 2700 (shoot), 3200 ppm (root) and 1911 ppm (shoot) and also 4125 ppm (root) and 1700 ppm (shoot).

Salinity, South Kalimantan, water plants

EP-03

Utilization agricultural waste in biodiesel preparation: A review

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Biodiesel is one of the energy sources as an alternative fuels designed to extend the usefulness of petroleum, and the longevity and cleanliness of diesel engines. Biodiesel has alternate benefit regarding ecological sustainability. On the other hand, the cost of production has been the main barrier in commercializing biodiesel, globally. With these complications in mind, this review attempts to identify possible solutions by exploring the potential of agricultural waste to be used as source of feedstock and catalysts in biodiesel preparation. Since agricultural waste content carbon and silica it is a potential to use as a matrix/template in the preparation of heterogeneous catalyst in esterification and transesterification. This review is a survey of various aspects of biodiesel production, focusing Asia. This review also gives a clear picture of various generations of biodiesel, their benefits and also their limitations.

Agriculture, biodiesel, esterification, transesterification, heterogeneous catalyst

EP-04

The effect of density fishes ratio on plant water productivity in aquaphonic fish farming system

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This study aims to determine the productivity of aquatic plants at various fishes stocking density ratio in the aquaponics system. This study is conducted experimentally using the Completely Randomized Design with the differences in the treatment of stocking density ratio, each repeated five times. The treatments of the stocking density ratio of both the catfish fry and the Nile tilapia fry include: A (75:75 fry/m^2), B (100:50 fry/m^2, and C (125:25 fry/m^2). The parameters measured were: (i) the productivity of crops, namely measurement the growth of kale and lettuce that include weight gain, long stems and leaves accretion, and (ii) water quality, including temperature, pH, dissolved oxygen (DO), BOD, nitrate, phosphate, and ammonia. The data obtained were analyzed descriptively. The results showed that the ratio of stocking density affects productivity lettuce and kale plants, and water quality in the cultivation media. Stocking density ratio which gives the highest productivity in the lettuce crop is 125 fry/m^2 catfish: 25 fry/m^2 tilapia fry, which is 23.51 cm stem length, leaf number 6 strands and a total weight of 445.4 g of leaves. The highest productivity for kale contained in the ratio of 75 fry/m^2 catfish: 75 nile tilapia fry/m^2, which is 59.14 cm stem length, leaf number 13 strands and a total weight of 465 g leaves. While the best water quality found in fish-breeding ratio of 75 catfish fry/m^2: 75 nile tilapia fry/m^2.

Catfish fry, Tilapia fry, plant water productivity, water quality

EP-05

The effect of extract organic fertilizer *Leucaena leucocephala's* to *Allium chinense's* insect pest attack at Pampang, Samarinda, East Kalimantan

Sonja V.T. Lumowa♥, Martha Fitriyani

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Allium chinense L (bawang lokio) is an agriculture plant that still unfamiliar to the farmers, even though it has many utility to cure serious illness and food seasoning. While *Leucaena leucocephala* L (lamtoro) leaf containing mimosin and volatile oils that prevents insect to eat the plant that it is potential to be a natural insecticide. The aim of this research was to determine effect of extract organic fertilizer of *Leucaena leucocephala's* to *Allium chinense's* insect pest attack at Pampang, Samarinda, East Kalimantan. This research is a field experiment using completely randomized design with 5 treatments and 25 repetitions. Research is held on plain land with assumption there is no significance different on land fertility, intensity of light and humidity. As each treatment is P0 (without extract of organic fertilizer *L. leucocephala*), P1 (35% extract of organic fertilizer *L. leucocephala*), P2 (40% extract organic fertilizer *L. leucocephala*), P3 (45% extract organic fertilizer *L. leucocephala*) and P4 (50% extract organic fertilizer *L. leucocephala*). The attack of insect was held in the 32th, 42th and 52th day after 1st cultivate. Result obtained analyzed by analysis of variance followed by 1% LSD. The result shown that Fcount (73.77) > Ftable (3.48), this data proved that the various dose of extract of organic fertilizer gave significant effect to decrease the attack of insect on *A. chinense*). There is significance different between P0 to P1, P2, P3 and P4.

Insect attack, lamtoro extract, Lokio

EP-06

Antiplasmodial activity of isoprenylated flavanones from the leaves of *Macaranga pearsonii*

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A new isoprenylated flavanone derivative, macapersoniin (1), together with three known isoprenylated flavanones, 4'-O-metyl-8-isoprenyleriodictiol (2), 4'-O-methyl-8-isoprenyl naringenin (3) and lonchocarpol A (4) had been isolated from the methanol extract of the leaves of *Macaranga pearsonii* Merr. that endemic Borneo plants. The structure of the new compound was elucidated as 4'-O'methyl-6,8-diisoprenyleriodictiol based on its spectroscopic data, including UV, HRESIMS and 1D, 2D NMR. Compound 1-4 were evaluated for their antiplasmodial properties against *P. falciparum* strain 3D7. Their IC_{50} values being 0.28, 2.47, 1.02, and 1.18 µg/mL respectively.

Antiplasmodial, macapersoniin, *Macaranga* pearsonii

EP-07

The effect of artificial feed containing *Sargassum* seaweed and commercial feed on the growth of milkfish reared with aquaponic system

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Sargassum seaweed can be used as an additional feed material for fish feed formula. this research was to determine the growth and survival rate of milkfish (*Chanos chanos*) fed artificial in the form of pellets containing 12% of *Sargassum* and commercial pellets, as well as the growth of of *Gracilaria* seaweed are well maintained with aquaponics system. The method in this research was experimental method with a randomized block design, consisting of 2 treatments and 10 replications and freelance basis methods for *Gracilaria*. The results showed significant differences in growth ($P < 0.05$) in milkfish were given pellets containing *Sargassum* than commercial pellet ($P > 0:05$); survival rate in both treatment > 70%, and % daily growth rate greater *Gracilaria* (0.33 ± 0:18%) than in the treatment of commercial feed.

Aquaponic, growth, milkfish, pellets, Sargassum

EP-08

Chitosan coating unreduced microbial contamination, but enhanched growth and development of hydrogel embedded protocorm like bodies (synthetic seed) of *Phalaenopsis amabilis*, Orchidaceae

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Chitosan is namely known as antimicrobial and plant growth stimulating chitin- derived substances. Thus, we explore these properties for building hydrogel- embedded protocorm-like bodies (synthetic seed) of mouth orchid, *Phalaenopsis amabilis*, through thin layer coating of the hydrogel beads. Two main focus of this study were to know the effect of chitosan coating on decreasing the risk of contamination and its potenciality in enhancing growth and development of the hydrogel-embedded plbs. We conducted two set experiments both in vitro and ex vitro for regenerating plbs via encapsulation into calcium-alginate hydrogel beads which coated with chitosan layer in their outer surface. Each set of experiments used a completely randomized design (CRD) with 6 treatments, every treatment group with 10 replications. The various concentration of chitosan used were: 0%, 0.5%, 1%, 1.5%, 2%, and 2.5% respectively. The percentage of contamination and germination, time of synthetic seed germinated, and roots emergence were analysed descriptively. Number of leaves, leaves length, and roots number were analyzed by Analysis of Variance (ANOVA), if there was a significant difference between treatment groups then followed by DMRT at 5% level. The result shown that, ex vitro experiment have no positive result except contamination in hydrogel layers indicating the limitation of chitosan in combating microbial growth outside the bottles. Controversially, all in vitro treatment have positive result both in preventing contamination and stimulating growth and development of the plb explants. Treatment by 0.5% to 2.5% chitosan gave a positive effect to the formation of complete organ include shoots, leaves, and roots, whereas control without chitosan didn't form root. Chitosan coating didn't affect significantly to the growth variables include the number and length of leaves.

Phalaenopsis amabilis, chitosan, synthetic seeds, growth, development

EP-09

In vitro regeneration induction of "Kepok Kuning" banana in East Kalimantan

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This research was a solution to free from "Kepok Kuning" banana desease decreasing the banana production in East Kalimantan. This research was divided into three years and it would be continued. The aim of this research was to produce the highest number of shoots regenerated from the explant, the center of banana corm, induced by several combination treatment of plant growth regulator i.e. Benzyl Amino Purine (BAP) and Indole Butyric Acid (IBA). This research conducted at Tissue Culture Laboratory, Faculty of Agriculture, Mulawarman University, from March to November, 2015. The research was designed in Randomized Completely Block Design (RCBD) with two factors. The first factor was BAP treatment consisting 3 level consentrations i.e. 2.5, 5 and 10 ppm and the second factor was IBA concentration consisting 3 level consentrations i.e. 0, 1 and 2 ppm. All treatment combination were replicated ten times. Result of this research showed that all combination of concentration treatment of plant growth regulator BAP and IBA could induce the growth and differentiation of explant derived from center of banana corm in Murashige and Skoog (MS) media, such as inbibition, developed tissue of explant, callusing and shooting, although the percentage and the total number was varied. The colour of callus was yellow and light green, while the structure was hard and compact. The highest average number of shoots induction was at treatments combination of BAP 10 ppm + IBA 0 ppm around 3.80 ± 1.76 shoots/explants, which have the uncomplete root development. Therefore it needs sub culture to induce the root with MS media containing IBA 10 ppm to form complete plantlets (seedlings), which could survive on acclimatization processing.

Free diseases, invitro regeneration, Kepok Kuning Banana, seedling propagation

Improving the ex-coal mining land due to Boron deficiency problem to increase land productivity in East Kalimantan

By:

Widi Sunaryo, Rahmat Sutarto, Sylvia Darman and Nurhasanah

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WHERE IS EAST KALIMANTAN?

East Kalimantan

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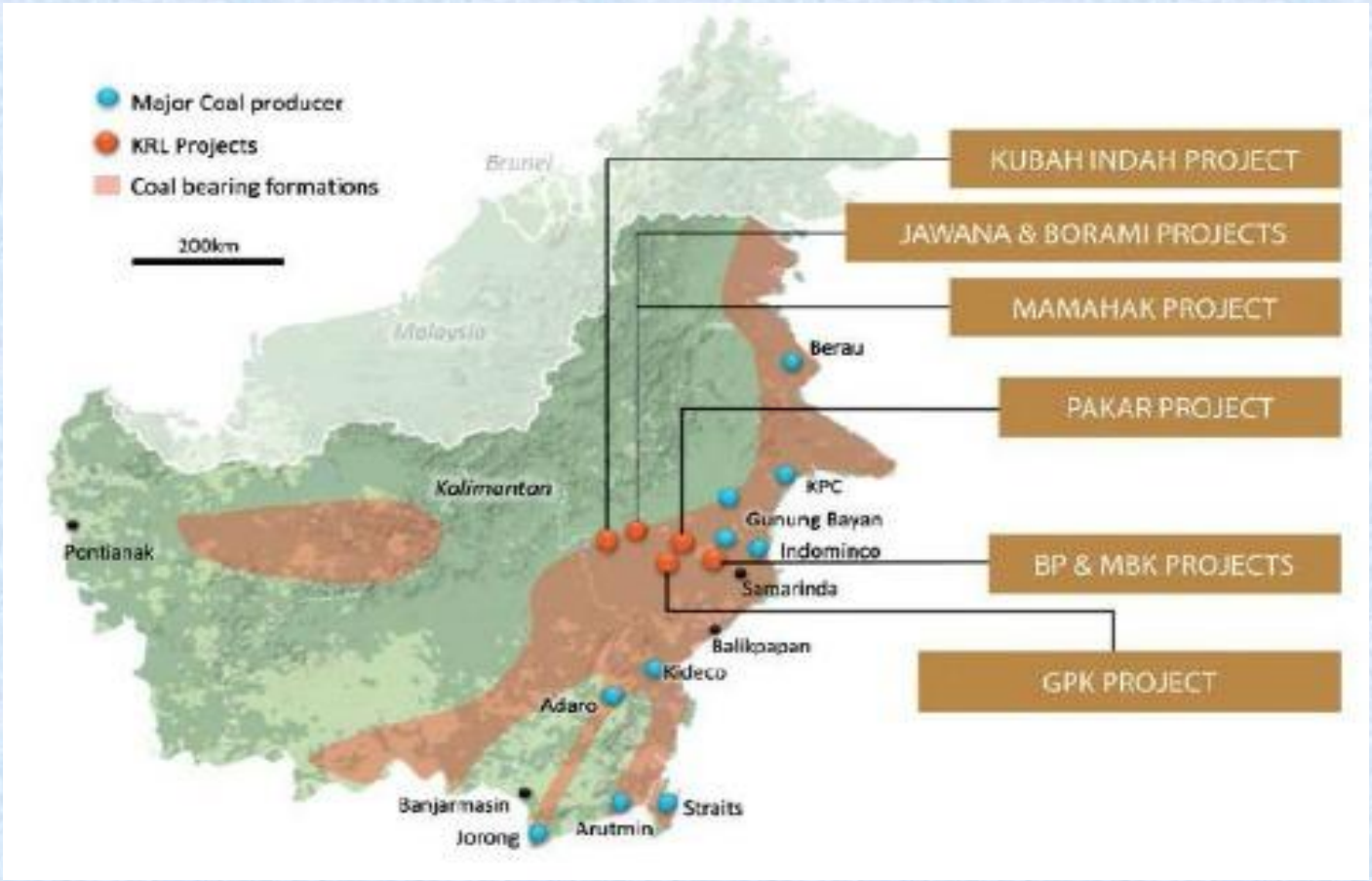
COAL MINING CONCESSIONS IN EAST KALIMANTAN



- Deposit 35,7 billion Tonne (37,5% of Indonesan Coal Deposit)
- 1034 concessions
- Total area 20.144.000 ha (East Kalimantan Government, 2012)

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COAL MINING IN EAST KALIMANTAN

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EX-COAL MINING PROBLEMS

- Inabililty to preserve Top Soil
- Altering the chemical, physical, biological properties of soil.
- Large area are continually becoming unfertile
- Extensive soil damage,
- Altering microbial communities
- Soil erosion resulting in soil compaction, low organic matter, loss of soil structure, poor internal drainage, and soil acidity problems.

BORON?

- Micro element / Trace element
- Sensitive of Leaching (Mobile)
- Physiological function:

  1. Sugar transport

  2. Synthesis of nucleic acids and plant hormones

  3. Essential for cell division and development

  4. Essential for photosynthesis and energy production
- Deficiency: the cessation of growth of buds or shoots, followed by the death of young leaves, so deficiency often gives plants a bushy
- Toxicity: Necrosis along the periphery of the leaf, Decreased Chlorophil concentration, decrease in CO_2 fixation / photosynthesis resulting in yellowing and death of leaf tips, starting with the oldest leaves first.

QUESTION?

How to solve the problem of Boron deficiency in the ex-coal mining soil for plant production in East Kalimantan ?

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EXPERIMENT DESIGN 1.

- Crop tested: Groundnut (Peanut/*Arachis hypogaea* L)
- Experiment was conducted at the soil taken from the one year after reclamation of ex-coal mining land
- Organic Fertilizer treatments: without organic fertilizer (control), Chicken manure, Goat Manure, Cow Manure, and Compost
- The Dose of application 30 tonne/ha of each treatments (150 g /15 kg soil in polybag)
- Boron fertilizer treatment: 0, 40, 80, and 120 mg/polybag
- Three replication
- B concentration before experiment 0,6 ppm
- Experimental design: Factorial Radomized Completely Block Design, two factors

RESULTS: SINGLE EFFECT OF ORGANIC AND BORON FERTILIZER SIGNIFICANTLY INCREASED THE GROUND NUT GROWTH AND YIELD

Plant Variables	Anova Test	Organic Vertilizer					Anova Test	Borate Fertilizer			
		Control	Chicken Manure	Goat Manure	Cow Manure	Compost		0 mg/plant	40 mg/plant	80 mg/plant	120 mg/plant
Plant height at 45 DAP	**	14.11 a	18.00 b	20.94 c	15.67 c	15.64 a	ns	17.18	17.45	16.45	16.41
Number of leaves at 45 DAP	**	29.58 a	39.00 c	42.67 b	31.96 ab	32.92 d	*	34.33 a	37.90 b	34.57 a	34.10 a
Number of pods per plant	**	26.96 a	36.96 b	39.67 a	34.79 b	36.79 b	ns	31.27	38.27	34.80	36.77
Number of seeds per plant	*	46.04 a	64.17 bc	73.67 c	64.00 bc	61.75 b	ns	83.50	63.10	60.87	68.27
100 seeds weight	ns	71.99	74.81	73.67	70.03	65.10	ns	68.83	67.78	72.94	72.87
Seed weight per plant	**	33.39 a	46.09 b	71.10 c	40.24 ab	40.75 ab	*	37.56 a	41.56 a	41.05 a	47.81 b
Harvest Index (%)	ns	39.69	41.35	49.71 b	39.14	37.42	ns	40.40	36.52	38.68	41.06
Relative Growth Rate (g g-1day-1)	**	0.07 a	0.08 ab	0.09 b	0.07 a	0.07 a	*	0.08 a	0.08 ab	0.09 b	0.07 a
Net Asimilation Rate (g g-1day-1)	**	0.0060 a	0.0069 b	0.0079 c	0.0058 a	0.0066 ab	**	0.0069 bc	0.0067 b	0.0073 c	0.0057 a
Plant biomass (g)	**	86.33 a	112.91 b	129.11c	104.30 b	108 b	*	94.52 a	115.05 bc	105.36 b	118.02 c

** : Significant at F test $\leq \geq$ Ftable 0,01

* : Significant at Ftable 0,05 $\leq$ F test $\leq$ Ftable 0,01

ns : not significant, F test $\leq$ Ftable 0,05

The diferences between mean values were tested using LSD at α : 0,05

RESULTS: EFFECT OF BORON TOTAL ACCUMULATION IN THE SOIL DURING EXPERIMENT CONTRIBUTED BY ORGANIC AND BORATE FERTILIZER TO GROUND NUT GROWTH AND YIELD

Treatment		Amount of Boron in the Soil (mg/polybag) *	Organic Fertilizer Contribution (mg/polybag) **	Borate Fertilizer Contribution (mg/Polybag) ***	Boron Total in the Soil (mg/polybag) ****	Boron Total In ppm	Plant Product Indicator	
Organic Fertilizer	Borate Fertilizer						Seed Weight per Plant (g)	Plant Biomass (g)
Control	0 mg /plant	9	0	0	9	0,60	20,04	46,99
	40 mg/plant	9	0	19,2	28,2	1,88	40,74	101,82
	80 mg/plant	9	0	38,4	47,4	3,16	38,61	102,51
	120 mg/plant	9	0	57,6	66,6	4,44	34,17	94,01
Chicken Manure	0 mg /plant	9	81,19	0	90,19	6,01	39,87	92,76
	40 mg/plant	9	81,19	19,2	109,39	7,29	38,15	119,37
	80 mg/plant	9	81,19	38,4	128,59	8,57	49,98	119,66
	120 mg/plant	9	81,19	57,6	147,79	9,85	56,35	119,91
Goat Manure	0 mg /plant	9	64,88	0	73,88	4,93	50,02	126,55
	40 mg/plant	9	64,88	19,2	93,08	6,21	50,20	143,91
	80 mg/plant	9	64,88	38,4	112,28	7,49	36,82	99,36
	120 mg/plant	9	64,88	57,6	131,48	8,77	61,78	146,63
Cow Manure	0 mg /plant	9	27,38	0	36,38	2,43	44,69	104,72
	40 mg/plant	9	27,38	19,2	55,58	3,71	36,78	101,14
	80 mg/plant	9	27,38	38,4	74,78	4,99	39,49	105,66
	120 mg/plant	9	27,38	57,6	93,98	6,27	40,01	105,69
Compost	0 mg /plant	9	24,19	0	33,19	2,21	33,18	101,59
	40 mg/plant	9	24,19	19,2	52,39	3,49	42,76	109,04
	80 mg/plant	9	24,19	38,4	71,59	4,77	40,35	99,61
	120 mg/plant	9	24,19	57,6	90,79	6,05	46,73	123,86

Note:

* : Calculated based on soil beginning soil analysis

** : Calculated based on organic fertilizer nutrient analysis

*** : Calculated based on Boron Content (48%) in Borate fertilizer

EXPERIMENT DESIGN 2.

- Crop tested: Palm Oil (*Elaeis guineensis* Jacq) at Nursery stage
- Experiment was conducted at the soil taken from from the ex-coal mining land before reclamation (after spreading)
- Organic Fertilizer treatments: without organic fertilizer (control), Chicken manure, Cow Manure, and Compost
- The Dose of application 30 tonne/ha of each treatments (150 g /10 kg soil in polybag)
- Boron fertilizer treatment: 0, 40, 80, and 120 mg/polybag
- Three replication
- B concentration before experiment 0,33 ppm
- Experimental design: Factorial Radomized Completely Block Design, two Factors

Results: Single effect of organic significantly increased the palm oil growth but Borate fertilizer did not give significant effect.

Plant Variables	ANOVA	Organic Fertilizer				Anova Test	Borate Fertilizer			
		Control	Chicken Manure	Cow Manure	Compost		0 mg/plant	40 mg/plant	80 mg/plant	120 mg/plant
Plant height Increment at 60 DAP (cm)	ns	5,66	8,16	11,16	8,3	ns	7,75	10,79	6,67	8,1
Plant height Increment at 90 DAP (cm)	*	5,66 a	11,04 b	14,53 b	15,28 b	ns	11,47	13,36	10,14	11,56
Plant height Increment at 120 DAP (cm)	*	5,67 a	15,33 b	17,58 b	20,81 b	ns	15,08	15,71	13,5	15,1
Plant height Increment at 150 DAP (cm)	*	5,83 a	26,83 b	25,83 b	31,39 b	ns	23,83	20,79	19,83	25,43
Number of leaves Increment at 60 DAP	ns	1,33	2,00	1,33	1,92	ns	1,83	1,58	1,42	1,75
Number of leaves Increment at 90 DAP	ns	2,25	3,17	2,5	2,75	ns	2,92	2,58	2,42	2,75
Number of leaves Increment at 120 DAP	*	2,92 a	5,42 c	4,08 b	4,75 bc	ns	4,67	4,33	4,17	4
Number of leaves Increment at 150 DAP	*	3,08 a	7,08 bc	5,92 b	6,50 c	ns	5,83	5,83	5,25	5,67
Stem Diameter Increment at 60 DAP (cm)	*	1,34 a	2,38 b	2,29 ab	2,87 b	ns	2,27	2,38	2,02	2,22
Stem Diameter Increment at 90 DAP (cm)	*	3,34 a	4,81 ab	5,69 b	5,02 ab	ns	4,67	4,63	4,64	4,93
Stem Diameter Increment at 120 DAP (cm)	*	5,82 a	6,49 ab	9,21 b	8,66 b	ns	8,35	7,25	7,05	7,52
Stem Diameter Increment at 150 DAP (cm)	*	7,13 a	12,97 b	14,54 b	15,18 b	ns	12,99	11,6	11,77	13,46
Total Leaf Area Increment (cm^2)	*	1302,39 a	6728,59 b	6199,22 b	5697,29 b	ns	6271,21	4765,12	3933,31	4957,85
Plant Fresh weigt (g)	*	174,86 a	492,32 b	380,79 ab	519,08 b	ns	440,02	351,44	371,52	354,07
Plant Dry weight (g)	*	62,58 a	154,78 b	127,19 b	162,69 b	ns	146,09	167,38	188,66	105,11

** : Significant at F test $\leq \geq$ Ftable 0,01

* : Significant at Ftable 0,05 $\leq$ F test $\leq$ Ftable 0,01

ns : not significant, F test $\leq$ Ftable 0,05

The diferences between mean values were tested using LSD at α : 0,05

RESULTS: EFFECT OF BORON TOTAL ACCUMULATION IN THE SOIL DURING EXPERIMENT CONTRIBUTED BY ORGANIC AND BORATE FERTILIZER TO PALM OIL GROWTH

Treatment		Amount of Boron in the Soil (mg/polybag) *	Organic Fertilizer Contribution (mg/polybag) **	Borate Fertilizer Contribution (mg/Polybag) ***	Boron Total in the Soil (mg/polybag) ****	Boron Total In ppm	Plant Product Indicator	
Organic Fertilizer	Borate Fertilizer						Fresh Weight per Plant (g)	Plant Biomass (g)
Control	0 mg /plant	3,3	0	0	3,3	0,33	159,78	77,43
	40 mg/plant	3,3	0	19,2	22,5	2,25	139,41	60,94
	80 mg/plant	3,3	0	38,4	41,7	4,17	302,33	77,52
	120 mg/plant	3,3	0	57,6	60,9	6,09	97,91	34,37
Chicken Manure	0 mg /plant	3,3	81,19	0	84,49	8,449	567,95	176,82
	40 mg/plant	3,3	81,19	19,2	103,69	10,369	356,56	135,66
	80 mg/plant	3,3	81,19	38,4	122,89	12,289	543,74	173,27
	120 mg/plant	3,3	81,19	57,6	142,09	14,209	501,04	133,38
Cow Manure	0 mg /plant	3,3	27,38	0	30,68	3,068	527,92	167,56
	40 mg/plant	3,3	27,38	19,2	49,88	4,988	334,66	103,00
	80 mg/plant	3,3	27,38	38,4	69,08	6,908	236,36	104,14
	120 mg/plant	3,3	27,38	57,6	88,28	8,828	424,23	134,06
Compost	0 mg /plant	3,3	24,19	0	27,49	2,749	504,42	162,55
	40 mg/plant	3,3	24,19	19,2	46,69	4,669	575,16	369,91
	80 mg/plant	3,3	24,19	38,4	65,89	6,589	403,65	399,69
	120 mg/plant	3,3	24,19	57,6	85,09	8,509	393,10	118,64

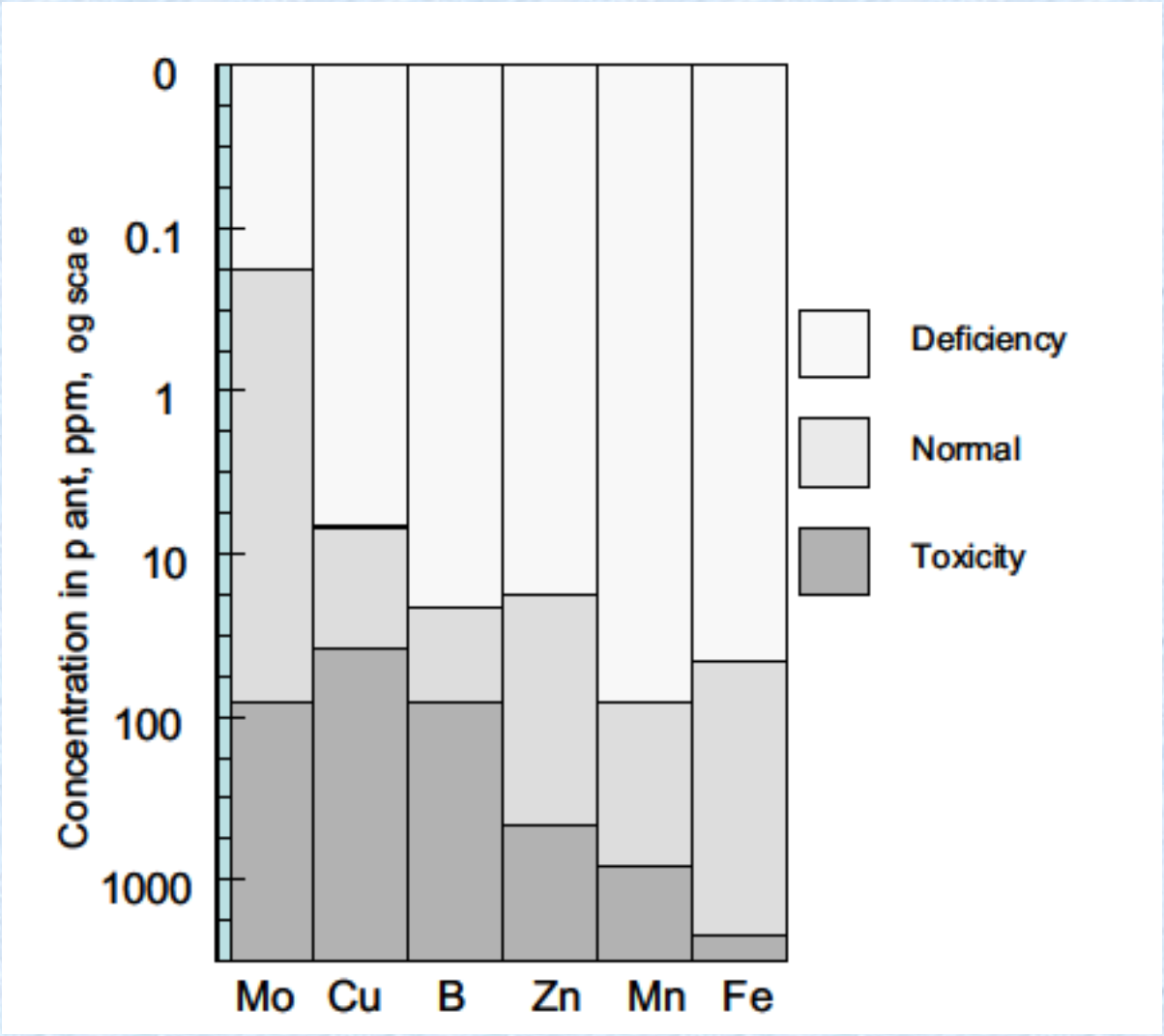
Note:

* : Calculated based on soil beginning soil analysis

** : Calculated based on Organic fertilizer nutrient analysis

*** : Calculated based on Boron Content (48%) in Borate fertilizer

Level of micronutrients in plants in mg/kg or ppm (based on data from many sources, reconstructed from Brady & Weil 2002).



Level of Boron in normal plants is around 25 – 75 mg/kg or ppm

Conclusion

- All organic fertilizer can significantly increase the growth and yield of groundnut and palm oil plant but the Boron fertilizer application did not give a significant effect.
- Organic fertilizer itself was sufficient to fulfill the Boron micro element need in the ex-coal mining soil.
- From the Boron accumulation analysis in the soil during the experiment, the increase Boron concentration did not give significant effect on the growth or yield of the plant.

Ex-coal mining land

Groundnut on ex-coal mining soil

Palm oil on ex-coal mining soil

Thank You
Vielen Dank
Terima Kasih

Soil analysis before experiment

- **pH: 5,6 (low, Optimal 5,8 -6,5)**
- **Total N : 0,05% (very Low)**
- **Available P_2O_5 : 19,7 PPM (very low, Optimum 36 - 50 PPM)**
- **Available K_2O : 18,4 PPM (Very low, Optimal 131 - 175 PPM)**
- **Organic Matter : 1,76% (very Low, optimal 4-6 %)**

- **Refference for Soil Nutrient Standard**

Soil analysis before experiment (The same location with experiment I)

- pH: 5,6 (low, Optimal 5,8 -6,5)
- Total N : 0,05% (very Low)
- Available P_2O_5 : 19,7 PPM (very low, Optimum 36 - 50 PPM)
- Available K_2O : 18,4 PPM (Very low, Optimal 131 - 175 PPM)
- Organic Matter : 1,76% (very Low, optimal 4-6 %)

- Refference for Soil Nutrient Standard

Soil analysis before experiment

- **pH: 2,2 (Very low, normal 5,8 - 6,5)**
- **Total N : 0,09% (very Low)**
- **Available P_2O_5 : 2,2 PPM (Very low, Optimal 36 - 50 PPM)**
- **Available K_2O : 8,7 PPM (Very low, Optimal 131 -175 PPM)**
- **Organic Matter : 0,88% (very Low, optimal 4 - 6 %)**

Tricho spp

- *Trichorderma harzianum, Trichorderma koningii, Trichorderma viride, Trichoderma hamatum dan Trichoderma polysporum. (Anonim, 2010).*

Soil nutrient standard **(Espinoza et al., 2006)**

TABLE 1. Interpretation of soil-nutrient concentration ranges and soil test levels of surface soil samples for most row crops and forages. The interpretation for vegetable crops and other plants may vary.

Soil Test Level	Expected Yield Potential†	Mehlich-3 Nutrient Concentrations								
		P	K [Most Crops]	K [Turf Codes]	Ca‡	Mg‡	SO_4-S‡	Mn‡	Cu‡	Zn
		mg/kg (or ppm)								
Very Low§	<65%	<16	<61	<21						<1.6
Low§	65 - 85%	16 - 25	61 - 90	21 - 40	≤400	≤30	≤10	<40	<1.0	1.6 - 3.0
Medium§	85 - 95%	26 - 35	91 - 130	41 - 60						3.1 - 4.0
Optimum	100%	36 - 50	131 - 175	61 - 100						4.0 - 8.0
Above Optimum (High)	100%	>50	>175	>100						>8.0

†Expected yield potential without fertilization.
‡Recommendations are not provided for these nutrients. The listed values represent general guidelines for interpretation.
§The soil test levels of "Very Low," "Low" and "Medium" are considered "Sub-Optimum" levels.