ABSTRACT

INTERNATIONAL CONFERENCE ON BIODIVERSITY

SOCIETY FOR INDONESIAN BIODIVERSITY

Yogyakarta, 19-20 March 2016

Rice field in Nglanggeran, Baturagung Mts.; photo by Irwan Julianur
ABSTRACT

INTERNATIONAL CONFERENCE ON BIODIVERSITY
SOCIETY FOR INDONESIAN BIODIVERSITY
Yogyakarta, 19-20 March 2016

THEME:
Agroecosystem Biodiversity: Managing Diversity in the Agricultural Landscape under Global Change
## TIME SCHEDULE

### International Conference on Biodiversity

**Society for Indonesian Biodiversity (SIB)**

**Yogyakarta, Indonesia, 19-20 March 2016**

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

AO-01

Genetic diversity of sweetpotato in the Arfak Mountain Region, West Papua

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Major factors that constitute a threat to food security is shifting Papuan diet from sweetpotato and sago to rice. This situation is exacerbated by implementation of the government program so called "Rice for Poor (Raskin)". The dependency on rice as what has been seen today is not favorable for food security in this region. Therefore, communities' awareness in maintaining the diversity of local food is needed for food security in this region. The research was conducted to achieve the following objectives: (i) Documenting the diversity of sweetpotato, its utilization, and overall cultivar frequency (OCF) and relative cultivar frequency (RCF) in the Arfak Mountain Regions, as well as gender knowledge towards sweetpotato cultivars, (ii) Identifying the trends in the use of cultivars, especially the overall decline and/or the frequency shift relative to other cultivars or other food crops, (iii) Determine the level of intervention that can stabilize the current sweetpotato diversity through the use of alternative and improving recognition of their contribution to the landscape tough. The study was conducted in 2012 in Minyambouw, Hink and Anggi districts of Arfak Mountain Region. Method of this study consisted of (i) Documentation of the community diversity level (CDD), collection and documentation of sweetpotato cultivars existed in the village or other social groups through group meeting. Meeting was previously planned and was carried out by invited farmers. Farmers were asked to bring all sweetpotato cultivars which are planted in their gardens (ii) Mapping RCF was done by counting the number of sweetpotato per sweetpotato cultivar at each plot. Based on the study, sweetpotato diversity in the Arfak Mountains is still relatively high. Based on documentation study of the community-scale (sweetpotato Exhibition): Hink District has the highest number of sweet potato cultivars (50 cultivars) compared to Anggi District (30 cultivars), and Minyambouw District (15 cultivars). Sweetpotato cultivars that have the highest OCF or brought by many participants are Syeb Nggrai and Syeb Ngoi and S. Simpeungei (Minyambouw), Bkau Ngoi (Hink), and Sweet Aug. (Anggi). The morphological characteristics of tubers and leaves of all sweetpotato cultivars were varied widely. There were several cultivars that did not longer planted by people in Arfak Mountains, such as Syeb Nipon, Syeb Sinong, and Syeb Snoggau in Minyambouw, Hiba and Bkaw Bkaw Braba in Hink, and Aug. Tug, Aug Bocop, and Aug Birerec in Anggi. In the selection of seeds for the next sweetpotato cultivation, the Arfak people prefer planting materials from their own garden. Vine cutting is used as planting material for sweetpotato cultivation.

Arfak, food security, genetic diversity, sweet potato

AO-02

Genetic diversity and conservation strategy considerations for highly valuable medicinal tree of Taxus sumatrana in Indonesia

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Genetic variation is considered to be the key factor for long-term survival of the species. The recognition of the
existing genetic diversity is the preliminary phase in development of an effective strategy for conservation of forest tree species. Taxus sumatrana is confined to grow naturally only in Asia, it is a rare and endangered species that in several Asian countries needs both ex situ and in situ protection. In its natural distribution, T. sumatrana is the only Taxus species that reaching its southernmost distribution to Sumatran forest-Indonesia. The objective of this research was to determine the genetic variation of T. sumatrana as baseline information for designing conservation strategy of the species. Leaves samples were collected from two natural population of T. sumatrana in Mt. Kerinci (Sungai Penuh-Jambi) and Mt. Dempo (Pagaralam-South Sumatra), both sites are stretched along Bukit Barisan Mountain Ranges of Sumatra. We sequenced two non-coding chloroplast DNA regions of trnL-trnF1 and psbC-trnS that each yielded 808 bp and 1092 bp, and rbcL gene of 523 bp, in which the total length covered 2423 bp. Surprisingly, we found no variation for all individuals and population, which means that the species is similar and both populations are having no structuring. This study also revealed on how a proper conservation strategy should be practiced for the species as we know that without a sufficient amount of genetic variation, a population cannot evolve in response to changing environmental conditions. In situ conservation program is a must that can maintain the existence of the species while at the same time keeping the sustainability of the entire systems; in other side ex-situ conservation strategy can take place as an additional effort to secure the genetic resources in case of the catastrophic events that might diminish their limited natural habitat.

Conservation strategy, cpDNA, genetic diversity, rbcL gene, Taxus sumatrana

AO-03

Vegetative and generative performance of groundnut genotypes under biotic stress environments

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The ultimate biotic factors that limited yields are pests, diseases and weeds. Among these three factors, pod yield of groundnut is mainly influenced by disease infestation, especially bacterial wilt and foliar diseases. The experiment was aimed to determine the response and tolerance of groundnut genotypes to bacterial wilt, leaf spot and rust diseases, and seed infection by Aspergillus flavus. The planting materials were 25 genotypes (11 Indonesia cultivars, 12 lines introduced from ICRISAT, 1 Indonesia promising line, and 1 local variety) with various superiorities on diseases resistance. A randomized completely block design with 3 replicates was applied. The plant spacing was 40 x 15 cm, 1 plant/hole. The basal fertilizers of 22.5 kg N, 36 kg P2O5 and 50 kg K2O/ha were applied at sowing. Crop maintenance was intensively undertaken. The results indicated that both genotypes from ICRISAT and Indonesia had similar response to leaf spot i.e. ranging from susceptible (score 6-7) to highly susceptible (8-9). The score for rust ranged from moderately resistant to susceptible. The average pod yield was 23.1 g/plant (from 11.9 g to 29.5 g), and 13 and 12 genotypes produced pods higher and lower than the average value, respectively. The highest and lowest seed yields were 19.0 g and 6.9 g, with 14 higher and 11 genotypes gave higher and lower seed yield than the average (13.3 g). ICGV 86158 and ICGV 95322 had the highest and lowest seed as well as pod productivity, respectively. The ICRISAT genotypes were susceptible to Ralstonia solanacearum infection, except ICGV 86590. Among the Indonesia cultivars, those with Valencia type of growth, relatively had better resistance to bacterial infection. These cultivars were also resistant to rust and A. flavus infection.

Biotic stress, generative, groundnut, vegetative performance

AO-04

The role of Dendrobium Orchid Homeobox 1 (DOH1) gene during in vitro shoot development of wild orchid Dendrobium lineale Rolfe

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Dendrobium lineale Rolfe is a wild orchid of Papua with many fragrant flowers. Plant propagation through in vitro culture techniques is the best method for ex situ conservation of this endemic orchid. The objective of this study was to analyze shoot development from embryo of D. lineale related to the involvement of Dendrobium Orchid Homeobox 1 (DOH1) during in vitro culture. This study was conducted in two steps: 1). Seed germination of D. lineale in VW medium with and without addition of 2 g/L Pepitone to produce protocorms (developing orchid embryo); and 2) Analysis of the expression of DOH1 gene during in vitro development of D. lineale protocorms. The results showed that embryo development of D. lineale were divided into six phases. Addition of 2 g/L Pepitone in the culture medium accelerated and increased the percentage of seed germination up to 100%, enlarged the protocorm size, greenish the protocorm and shoot initiation. Molecular analysis showed that the DOH1 cDNA with a size of 1.2 kb start can be detected earlier in protocorm aged 3 weeks after sowing (WAS) that grown in medium supplemented with pepitone than that on basic VW medium, and at the age of 5 WAS the expression of DOH1 can be detected in all treatments. The most effective medium for seed germination and shoot induction in vitro is VW + pepitone.
AO-06
Genetic variation and phylogenetic tree of *Coura amboinensis* in Central Indonesia based on cytochrome B gene sequence
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The population of *Coura amboinensis* which spread over central Indonesia area is decreased. Analysis of genetic variation and phylogeny is one effort to conservation focus through prediction the genetic diversity of these population. Mitochondrial DNA is one of the commonly used molecular markers to study it. The purpose of this research that revealed the genetic diversity and phylogeny of *C. amboinensis* based on cytochrome b gene sequences. Descriptive exploratory study was carried out to obtain gene sequences of mitochondrial cytochrome b. The sample of *C. amboinensis* was collected from Ambon, Kendari, Gorontalo, Luwu, Toli-Toli, and Sangir area. As an out group sequence is used cytochrome b gene sequences from Cuora trifasciata. The series of research activities include: DNA isolation, DNA purification, polymerase chain reaction (PCR), horizontal electrophoresis, sequencing, data analysis with MEGA 5.21 software. Based on the data analysis showed that the phylogenic tree of *C. amboinensis* in this study is closely related. The values of genetic distance ranged ≤ 0.30, and the value of similarity and variants on average by 82.5%. The conclusion of this study is the phylogeny of *C. amboinensis* that distributed in central Indonesia is closely related, because of the value of genetic variations too small.

*Coura amboinensis*, cytochrome b gene, genetic variation, phylogenetic tree

AO-07
Plant collection in South Sulawesi for sugarcane improvement
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Success of any crop breeding program is depended upon the extent of genetic variability present in the germplasm holding; the higher the extent of genetic variation the higher the chances of success. At present, sugarcane germplasm collection at the Indonesian Sweetened and Fibre Crop Research Institute (ISFRI), the current government institute for sugarcane R & D, is very limited. To widen the genetic base of the crop, in-country germplasm collecting mission was mobilized to Kendari

AO-05
Genetic variety of local varieties of rice South Sumatra based on Polymerase Chain Reaction-Random Amplified Polymorphic DNA (PCR-RAPD)
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South Sumatra is rich of germ plasma with local varieties of rice and high-yielding varieties. The existence of local varieties of rice is in danger. This is due to the introduction of high-yielding varieties of rice which causes gradually the local varieties of rice abandoned by the rice farmers. Superior properties owned by local varieties of rice are stored in the genes. Genetic variation in plant breeding activities are important as an information basis for plant breeding. This research aims to determine genetic variety of 22 local variety of rice South Sumatra based on PCR-RAPD. this research has been done on August 2015 to December 2015, at The Laboratory of Microbiology and the Laboratory of Genetics and Biotechnology, Departement of Biology, Faculty of Mathematics and Natural Science, Sriwijaya University, South Sumatra, Indonesia. Obtained as many as 22 local varieties of rice samples collected from the South Sumatra in collection of population from Ogan Ilir district, Kelingi Muara district, Banyuasin district, Musi Rawas district, Muara Enim district and Ogan Komering Ilir district. Genetic variations identified using PCR-RAPD techniques. 7 primers (OPA, OPA-9, OPA-10, OPA-13, OPA-16, OPA-19, OPB-8) were used for amplification. Based on the research that has been done, all primers can produce polymorphic band with a total of 70 polymorphic DNA bands (100 bp 900 bp) 53.6%. This indicates a high genetic variation. Primer most polymorphic DNA fragments that OPA-13, OPA-19, and OPB-8. Additionally obtained also specific DNA bands of primer OPA-3 (100 bp) Dayang Telash accession, primer OPA-9 (375 bp) Dayang Kuning accession, OPA-13 (700 bp) Panak/Pendek accession, DNA bands indicate the presence of specific polymorphisms properties.

Genetic variety, local varieties, PCR-RAPD

AO-06
Genetic variation and phylogenetic tree of *Coura amboinensis* in Central Indonesia based on cytochrome B gene sequence
Mohamad Amin*, Endang Suarsini, Umie Lestari, Abdul Gofur, Dwi Martha Nur Aditya, Devan Aditya Rahman, Candra Hermawan

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*Coura amboinensis*, cytochrome b gene, genetic variation, phylogenetic tree

AO-07
Plant collection in South Sulawesi for sugarcane improvement
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AO-08

Screening, characterization of endo-xylanase enzyme as accessory enzyme to enhance of sugar cane bagasse saccharification in biorefineries applications

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Development of second-generation of biofuels technology which produced from lignocellulosic biomass becomes the research focus in the world. One method that can significantly increase the efficiency of converting biomass into bioethanol is consolidated bioprocessing (CBP). The utilization of enzyme in CBP is very expensive, so for the development of Bio-refinery, the reduction cost of enzymes are very important. We need a strategy that makes the biorefinery process more economical by improving the performance of the enzyme. Screening and characterization of novel bacteria capable of producing high level cellulase and hemicellulose seem to be all suited starting point for obtaining improved cellulase and hemicellulose hydrolysis via boosting of co-adjuvant enzymes. The objective of this research are screening and characterization of novel bacteria from Biotechnology Culture Collection (BTCC) capable of producing high level hemicellulose-degrading enzymes, especially for endo-xylanase enzyme. Using a collection of local microorganisms and its genetic resources, combined CBP technologies is considered to be a good solution to improve the process to make it more efficient for utilization of lignocellulosic biomass for the production of bioethanol. We have been screening more than 797 isolates from Indonesia Actinomycetes by using congo red, SDS-PAGE and zymogram methods and get seven isolates capable producing high level of xylanase enzymes based on the diameter of clear zone more than 1.5 cm on xylan plate media pH 5 and 6. Some isolates were identified as a Strepotmyces sp and Kitasatospora sp. There are six isolates have ability to produce xylanase optimum at pH 5, one isolate pH 6 and temperature range 50-70 °C with range activity from 1.3-5.8 U/ml. Each isolate has molecular weight from 20-50 kDa based on SDS-PAGE and zymogram analysis. From these characterization showed that these isolates potential used for saccharification of sugar cane bagasse and oil palm empty fruit bunch (OPEFB) by consolidated bioprocessing (CBP) for biorefinery applications.

Biotechnology Culture Collection (BTCC), consolidated bioprocessing (CBP), endo-xylanase, hemicellulase, saccharification

AP-01

The diversity of local cattle in Indonesia and the efforts to develop superior indigenous cattle breeds

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Cattle breeding is regarded indigenous to Indonesia. In the country, there are three species of cattle breeds, i.e.: zebu (Bos indicus), Bali cattle (Bos javanicus), and taurine (Bos taurus). These breeds are farmed for their meat, milk, hides, and for agricultural work. Zebu were introduced by the Indians in the beginning of the first century. Bali cattle are indigenous breeds that have been domesticated from wild bantengs (Bos javanicus) in Java and Bali for hundreds of years. Several breeds of taurine were imported in early eighteenth century to be used for dairy cattle. Zebu and taurine are the major cattle breeds of the world; whereas in Indonesia, the major cattle breeds are Bali cattle, Ongole crossbred, and Madura cattle, which is a crossbred of the two. Primary breeding between species in the genus Bos will result in sterile male and fertile female offspring. However, secondary breeding with a crossbred female will result in fertile offspring. In Indonesia, there are several local cattle breeds of zebu that have adapted to the local condition, for example Ongole crossbred, Aceh cattle, Pesisir cattle, Sumba Ongole, and the less commonly found Galekan cattle of Trenggalek. In addition, there are many hybrids between zebu and Bali cattle such as Madura cattle, Jabres cattle of Brebes, Rancah cattle of Ciamis, and Rambon cattle of Bondowoso, Banyuwangi, and the surrounding areas. A crossbreeding between zebu and taurine produces Grati dairy cattle. In 1970s, an Artificial Insemination program was conducted in a large scale using male cattle and semen from several breeds of zebu (Brahman, Brahman Cross) and taurine (particularly Simmental, Limousin, Holstein Friesians). The program resulted in more complex genetic mixes. Crossbreeding conducted directly in the field causes a concern since it...
may threaten the purity of the native species and decrease the cattle’s potential for adaptation, reproduction, and productivity. It is better to conduct crossbreeding programs privately in research centers or corporate/large farmers, of which the result can be distributed to smaller farms. “Ongolization program” that was introduced in the early twentieth century should be a lesson to learn, because it had led to the extinction of Javanese cattle, while the produced offspring, the crossbred Ongole, are considered unsatisfactory so that they still have to be crossbred with other species of cattle, particularly taurine.

Bali cattle, crossbreeding, local cattle, taurine, zebu

AP-02

The performance of agronomic character and diversity from 62 accession of sweet potato germplasm

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Sweetpotato (Ipomoea batatas) is an alternative carbohydrate source to overcome the shortage of rice due to the impact of the higher population growth and climate change. This study aims to determine the performance and the range of genotypes and phenotypes of agronomic characters 62 germplasm accessions of sweetpotato. The experiment was conducted in April-August 2013 at Muneng experimental station, Probolinggo, East Java. The material used was 62 accessions of sweet potato ILETRI germplasm collection. The research was arranged in a randomized complete block design (RCBD) with two replications with plot size of 1 m x 5 m, with 100 x 25 cm spacing. Harvesting was done at 4 months after planting. Variables observed included: vines length, branch number, chlorophyll index, the weight of the canopy, harvest index, root length, root diameter, number of tuber per plot, tuber yield, and tuber dry matter content. Results of analysis of variance showed highly significant genotype at all the characters observed. MLG 12695 showed the highest tuber yields followed by MLG 12505, while the MLG 12707 showed the lowest tuber yields followed by MLG 12645. All the characters show a wide range of phenotypes and genotypes are broad. All the characters also showed high broad sense heritability.

Agronomic characters, Ipomoea batatas, sweet potato, phenotype diversity genotype diversity

AP-03

Genetic diversity of sun-flower (Helianthus annuus) germplasm based on quantitative and qualitative morphological characters

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In Indonesia, sun-flower has not been widely cultured by farmers and companies who produce sun-flower oil. Recently, many people are interested in to developed this crop due to their lots of benefits. Indonesian Sweetener and Fibre Crops Research Institute (ISFCRI) have started to prepare some varieties for sun-flowers (Helianthus annuus L.) development in the future. Sun flower germplasm collection in ISFCRI has been characterized. Characterization was aimed to distinguish the morphological characters of each genotype in germplasm collection. Based on these morphological quantitative and qualitative characters, the genetic diversity of sun-flower germplasm was observed. The activity was carried out in the Pasirian Experimental Station, Lumajang District. The location is placed on 110 m above sea level and in 113° E and 8° LS. The climate in this location is included in C type (Smith Ferguson), with an annual rainfall of 1,700 mm and 120 rainy days per year. Research was conducted in March to December 2015, germplasm characterized were 33 accessions. Each accession was planted in 32 m² plot size with four lines. Fertilizer dose was 75 kg Nitrogen + 30 kg P2O5 + 30 kg K2O per ha. The results showed that the low coefficient of variation values were found in some quantitative morphological characters of Sun-flower, namely: seed size (3.51%); 100 seeds weight (2.60%); seeds thickness (4.82%); plant height (9.62%); leaf size (8.85%); ray floret length (7.32%); bract length (12.06%); head size (6.87%); and the flowering time (4.37%). While the qualitative characters observed in sun-flower germplasm presented high coefficient of variation values, except pollen production character in flower discs. These results indicated that sun-flower accessions showed a high genetic diversity based on the qualitative morphological characters.

Characters, diversity, qualitative, quantitative, sun-flower

AP-04

The effect of mutations induced by gamma-ray irradiation to the performance of Reutealis trisperma

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Reutealis trisperma (Blanco) Airy Shaw is one of the potential commodities as bio-fuels. Improvement of R. trisperma new varieties needs sufficient genetic materials so the expected new varieties can be produced. To increase
genetic diversity of *R. trisperma*, the radiation mutation by gamma-ray was done. This study aimed to determine the effect of mutations induced by gamma-ray irradiation to the performance of *R. trisperma*. The treatment consists of 7 doses of gamma ray irradiation are: 50, 100, 150, 200, 250, 300 Gy and control. Experiment gamma irradiation (60Co) at 100 *R. trisperma* seed (KS 2) each doses, conducted at the Center for Isotope and Radiation Applications (BATAN) Jakarta. Evaluation of germination was done by planting seeds in poly-bag 10 x 12 cm with sterile sand medium in Indonesian Sweetener and Fiber Crops Research Institute. At the age of 30 days displacement in poly-bag 25x25 cm with soil: sand: manure in the ratio 1: 1: 1. Maintenance of seed was done up to the age of 4 months. Based on the results of the evaluation showed that gamma irradiation had positive effect on germination rate *R. trisperma*. Irradiation may increase between 5.28 to 9.26 times faster than control. Lethal doses of gamma ray irradiation for *R. trisperma* is 150 gray. While the concentrations of 250 and 300 Gy resulted in damage to *R. trisperma*. Beside that, Gamma ray irradiation increase the diversity of *R. trisperma* plant leaves. In general, the growths of mutants *R. trisperma* up to the age of 4 months improved by radiation mutation compare to control.

Gamma-ray, mutation radiation, *Reutealis trisperma*

**AP-05**

Response of 14 soybean genotypes to whiteflies (*Bemisia tabaci*): Antixenosis, antibiotic, and tolerance

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The attack of whiteflies (*Bemisia tabaci* Genn.) in soybean cultivation in Indonesia is one of the limiting factors in increasing the national soybean production. Planting resistant varieties could reduce yield losses due to the damage caused by these pests. This study was conducted to evaluate the resistance of 14 soybean genotypes to the whiteflies. A free-choice test and no-choice test was conducted in a greenhouse to study the antixenosis and antibiotic. Meanwhile, field testing was conducted to determine the tolerance of soybean genotypes to the whiteflies. Determination of the resistance of soybean genotypes to whiteflies based on the intensity of leaf damage that occurs on fifth weeks after infestation. Anjasmoro varieties which used as susceptible checks show sensitivity to whiteflies. Adults and nymphs in small numbers on the surface of the leaves of Anjasmoro has been causing damage to leaves of up to 76.59% in free-choice test and 45.15% in no-choice test. G100H/9305/IAC-100-271 demonstrates the sensitivity to whiteflies that is similar to Anjasmoro. Gema varieties that served as moderately resistant check indicate antixenosis mechanism that correlated with leaf thickness, length and density of leaf trichomes. The characteristics of long trichomes and rarely as thick leaves cause Gema are not favored by the whiteflies for oviposition. There are four genotypes showed antixenosis mechanism similar to Gema, namely IAC-100/Kaba-6, Malabar/IAC-100-85, Kaba/IAC-100/Burangrang-60, and Kaba/IAC-100/Burangrang-63. In the no-choice test, antibiotic mechanism can be seen from the small number of adults that develop from nymphs. IAC-100/Kaba-8 and IAC-100/Kaba-14 showed a high degree of antibiotic. In addition, the results of field experiment showed that Gema, IAC-100/Kaba-14, and Tanggamas/Pangrango-78 demonstrated a tolerance mechanism to whiteflies. It is shown from a slightly decrease in grain yield of the three genotypes (17.33, 19.31, and 19.85% respectively).

**Glycine max**, host plant resistance, non-preference, resistance mechanism, yield reduction

**AP-06**

The response of soybean genotypes introduced from South Korea to drought stress during the reproductive stage

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Soybean productivity is still low. There is an urgent need to use more land to increase soybean production. The objective of this study was to evaluate the productivity and environmental adaptability of several soybean genotype introduced from South Korea to drought stress during reproductive stage. The study conducted on twenty soybean genotypes originated from South Korea and three varieties as checks (Mutia, Grobogan, and Dering 1). The entire genetic material planted at the Kendalpayak Experimental Station and under rain-shelter in Malang on dry season in 2012. Each genotype was planted in single rows along 2 m and without replication. Row spacing used was 40 cm x 15 cm. Fertilization was conducted according to the dosage recommendation i.e. 100 kg ha-1 of Urea, 100 kg ha-1 of SP36, and 75 kg ha-1 of KCl. Irrigation was only given at planting and during flowering for drought stress condition during the reproductive phase. Observations included days to flowering, days to maturity, plant height, number of branches, number of fertile nodes, number of pods, number of empty pods, weight of 100 seeds, and weight of seeds per plant. The results showed that five of 20 genotypes were tested had resistance to drought stress at the reproductive stage, equivalent to Dering 1. Four genotypes of them (Daewon, Ilmi, Jangmi, and Mausu) has a large seed size and early maturity.

Drought stress, *Glycine max*, genotype introduce, reproductive phase
Improvement of genetic variability in seedlings of *Spathoglottis plicata* orchid through X-ray irradiation

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Developing genetic variability of orchids via mutation is promising for orchid breeding. The objective of this research is to improve genetic variation of *Spathoglottis plicata* orchids through X-ray-irradiation of the orchid seeds. The method was conducted using seedlings that X-ray irradiated with various doses (0, 6, 12, 18, and 24 rad). The seeds were sowed on a half strength of MS medium, seeds were grown into protocorms (tuber-like developing orchid embryo), 8 weeks-old were subcultured onto NP-SIM medium. Five months-old seedlings were subcultured again into a new flask. The observation is focused on the morphological variation of the seedling. Genetic variability detection is conducted using PCR RAPD based on nine primers, those were OPA1, OPA2, OPA11, OPA12, OPA14, OPB1, OPB4, OPD12, OPD14. The data is analyzed using GenAlex 6.1 software to obtain the genetic distance. Moreover, utilizing NTSys ver.2, the data was analyzed for clustering by means of UPGMA method and a dendrogram based on Neighbour Joining model is completed. The result showed that X-ray irradiation with doses of 18-24 rad is able to stimulate morphological variation of seedlings, especially characters of leaf, root and shoot. Interestingly, X-ray irradiation was also induced in vitro early flowering. Based on the dendrogram of genetic distance and polymorphism percentage of the group of mutants which are bigger or farther from wild type group, it is concluded that 18-24 rad doses of X-ray irradiation can be used for induction of genetic variability in orchid.

Genetic variability, seed, seedling phenotype, *Spathoglottis plicata*, X-ray

The study of soybean genotypes response against Asian soybean rust (ASR)

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Asian soybean rust (ASR) caused by Phakopsora pachyrhizi is a major disease limiting soybean yield and has widely spread on soybean plantation in Indonesia. The resistant cultivars availability is one of key component for the successful of ASR control. The objectives of this study were to assess the resistance of soybean lines from the crossing of two large-seeded cultivars (Baluran and Grobogan) with broad adaptation cultivar (Kaba), and identify the characteristic of resistant genotypes under screen house conditions. All genotypes tested were artificially inoculated with *P. pachyrhizi* at three weeks after planting. The observations were made on the number of pustules per leaf, the development of ASR trough the modified IWGSR method, and yield components including number of intact pods per plant, number of empty pods, and weight of pods per plant. The result showed that thirteen lines of Baluran pedigrees have higher resistance response to ASR compare with Grobogan pedigrees. Resistant lines have fewer number of pustules (8 pustules cm-2), lower value of area under the disease progress curve (AUDPC), and have redish brown (RB) lesion type. In contrast, susceptible lines have plenty of pustules (> 21 pustules cm-2), higher AUDPC value, and has mixed lesion type (RB and Tan). ASR reduces seed size and yield. The average weight of 100 seed on resistance lines was 10.2 grams while on susceptible lines ranged from 8.74 to 12.64 grams. The average yield per plant varies from 2.79 gram to 6.11 grams. Baluran/Grobogan pedigrees more susceptible to ASR than Baluran/Kaba pedigrees but they showed better yield per plant, and supposedly more tolerant to ASR.

Asian soybean rust, genotype, resistant, susceptible

Genetic relationship among Indonesian mungbean germplasm based on quantitative traits

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Mungbean (*Vigna radiata*) is an important cash crop legume in Indonesia, especially in dryland. Identification and evaluation germplasm collections plays important role for mungbean breeding program. The aims of this study were to determine the genetic relationship among mungbean accessions based on quantitative traits. A total of 122 accessions of mungbean germplasm from local collections Indonesia cultivated in Jambegede Research Station (Malang) on dry season 2014. Each genotype was planted in a single row along 4 m plot with plant spacing of 50 x 10 cm, and two plant was maintained in every hole. Thirteen variables quantitative and five variable qualitative were observed. Data were analysis using principal component analysis (PCA) and cluster analysis. The results showed that five principal components (PC) contributed
76% of total variation. The most important characters for PC 1 was number of branches, number of fertile branches, number of pod cluster, and number of filled pod. PC 2 was days 50% to flowering and maturing days. PC 3 was wilt disease; PC 4 was seed weight per plant and plant height, and PC 5 was 100-seed weight. The dendogram clustered 122 accessions into four groups. Based on clusters analysis there were four clusters with similarity distance 72.29%. Cluster I was the largest group which consisted of 59 accessions. Cluster II consisted of 45 accessions. Cluster III consisted of 11 accessions and Cluster IV consisted of seven accessions. There was no parallelism between geographical distributions in each cluster. Among them, cluster IV was the most interesting, as its member consist of accessions which susceptible to wilt disease.

Genetic diversity, Vigna radiata, wilt disease

AP-10
Phenotypic test and identification of microsatellite markers related to aluminium tolerance in upland rice
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Upland rice grown in many sub optimal fields such ultisol field that spread in Indonesia. The main obstacle of utilizing ultisol field is the high acidity levels, which caused by aluminum (Al) stress. In order to utilize that land, we require Al tolerant upland rice varieties. Identification of upland rice coding Al tolerant trait has not been much studied yet. The research objectives are to study and identify markers for upland rice coding regarding to Al tolerance. The genetic material in this study used 36 rice lines F6 generations from B11930F-TB-2 x Situ Patenggang. The strains were selected on acid field in East Lampung by category: tolerant, moderate and sensitive to Al. ITA and IR60080-32 varieties was used as a comparative control for sensitive and tolerant. Phenotypic test for Al tolerance in laboratory used nutrient culture with 60 ppm AlCl3. While genotypic test was done with selection of SSR markers that suspected linked to Al tolerant. Phenotypic test result showed a shift in the level of tolerance between the results in the field (East Lampung) and result in nutrient culture (lab). Suspected from the results on field, other than specified by the dissolved Al content, it was also influenced by other factors such as microclimate and soil fertility diversity, while in nutrient culture results showed that stress occurred as a single factor because of dissolved Al. The markers analysis results showed that markers RM257, RM340, RM481, RM201, RM526 and RM17 are considered as the most informative markers to use as coding for Al tolerant because it has PIC (Polymorphic Information Content) amount as 0.5. Phylogenetic tree shows three groups of upland rice: (i) ITA, (ii) IR6008032 and B11930F-TB-2, (iii) Situ Patenggang and crossbred strains.

Aluminum tolerant, SSR markers, upland rice

Diversity of species

BO-01
The impact of deforestation rate for extinction biodiversity in Indonesia
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The purpose of this study was to examine the impact of deforestation on biodiversity loss in Indonesia. Firstly author presented information about deforestation trends that spread across Indonesia. And presented information about forest fires that triggered off the continuous deforestation and occurred one after another throughout the year. The collected data showed deforestation and forest fires have occurred since 1960 to 2015, and deforestation and forest fires implicated in the extinction of species diversity, genetics, and ecosystems that spreads from Sunda region to Sahul region. Author used descriptive regulation and legislation methods, used literature approach, as well as arranged with descriptive and interpretational form in papers. From the results of this study author concluded that deforestation rate implicates in forest fires that occur continuously throughout the year and can not be inevitable possibility of extinction of biodiversity spread across Indonesia.

Deforestation, impact, forest fires, biodiversity loss

BO-02
Lichen: Comparative study between Campus Area of Universitas Muhammadiyah Surakarta and mountain forest of Sekipan Karanganyar, Central Java
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Lichen is a plant that lives attached to the trunks of trees, rocks. Lichen is very sensitive to pollutants. The rapid increase in the use of motor vehicles have a large impact on
the emergence of pollution in the region. Increasing the quantity emitted by the transport sector, especially vehicles on the road resulting in high levels of air pollution influenced the morphology of lichen. The research location is divided into two kinds of wide area i.e. campus area and the forest. The research using exploration method. The 1st station was the campus area and the 2nd station was in the forest. The parameters were lichen morphology and lichen colonies. Species richness was locally in the forest, with somewhat higher diversity of lichens and lower diversity of lichen in the campus area. The results showed that the environment is directly affected by the activities of pollutants come from motor vehicles emission can be seen from the percentage of lichen that grows in the area.

Air pollution, pollutants, bioindicator, lichens, emissions

**BO-03**

Preliminary test of Agri-Environmental Scheme adoption in farmland of northern slope of Mount Slamet, Central Java, Indonesia

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Agricultural intensification poses the largest threat to biodiversity that affect ecosystem services such as pollination and considerable result showed that pollinator decline may have economic consequences. Agri-Environmental Scheme (AES) were introduced in Europe in the early 1990s in response to declining farmland biodiversity. The provision of floral resources for the enhancement of insect pollinators populations in agroecosystem as one of AES methods has been done at Northern Slope of Mount Slamet at May to October 2012. The three of main crops (tomato, strawberry and chili peppers) combined with 0%,5%,10%,and 15% of wild plant species i.e Cleome rutidosperma, Tridax procumben, Boreria laevicaulis and Euporbia heterophylla. The result showed that species richness of insect pollinators has different between wild plant C. rutidospremae (8.35 species), B. laevicaulis (8.17 species), E. heterophylla (8.89 species), and T. procumber (8.39 species) and block of tomatoes showed the highly species richness (11.5 ± 0.57).

Enhancement of agroecosystem with four wild plant and different density showed that combination with 15% has highest species richness of insect pollinators. From the result can be concluded that enhancement of agroecosystem with wild plants species increase insect pollinators species richness

Agri-Environmental Scheme, diversity, enhancement, insect pollinators, wild plant

Heavy metal pollution is a serious problem mainly caused by industrialization, that produces large quantities of wastewaters containing high concentrations of heavy metals. Wastewater consists of microbial populations adapted to the toxic concentrations of heavy metals and become resistant by accumulating copper inside the cells. The aim of the study was to characterize the ability of microbial isolates isolated from industrial sewage in Rungkut-Surabaya in accumulating copper. The copper resistance of microbial isolates was determined by measuring minimum inhibitory concentration (MIC). The ability of each isolates to accumulate copper were determined by atomic absorption spectrophotometer. The results showed that there were eight bacterial isolates and nine yeast isolates with 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 resistant yeast isolates were designated as isolates C1, C2, C4, and isolates ES9.3, ES10.2, respectively. Isolates C1, C2, and C4 accumulated 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 accumulated Cu of up to 0.52 mg per gram dry weight of cells. Copper resistant microorganisms with their ability to accumulate copper may have significant role in wastewater treatment plant.

Bioaccumulation, copper-resistance, bacteria, yeast

**BO-05**

Diversity of parasitic plants and their hosts in homegardens agroforestry in Kepala Jeri and Pemping Island, Batam

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Parasitic plant grow attached to host plants either cultivated or wild plants as parasite either cultivated or grow wild. Research aimed to know diversity of the parasitic plants and their hosts in home gardens agroforestry was conducted in Kepala Jeri and Pemping Islands Batam in October 2014 using explorative methods. Inventory and
The diversity and distribution of Holothuroidea in shallow waters of Baluran National Park, Indonesia

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A study of the diversity and distribution of sea cucumber (Holothuroidea) in shallow waters at Baluran National Park, East Java, Indonesia was carried out from July until September 2015. The method used in this study was systematic transect in low tide condition. Samples were collected by hands at intertidal sites. Identification of sea cucumber species based on morphological ossicles. Twenty one species of Holothuroidea belonging two orders and four families were found in this study. The most dominant family found was Holothuriidae (16 species), followed by Stichopodidae (2 species), Synaptidae (2 species), and Chiridotidae (1 species). Four species (Holothuria olivacea, H. verrucosa, Labidodemas rugosum, and Chiridota smirnovi) are new record for Java waters and one species (H. papillifera) is a new record for Indonesian waters. Two morphospecies (H. aff. macroperona and Stichopus cf. monotuberculatus) need reconfirmation to species level. The highest abundance species of Holothuroidea was found at under rock with 15 species. Whereas, the highest number of individuals was found in seagrass areas with 5457 individuals. H. atru has extensive habitat distribution, such as seagrass, macroalgae, coral reef, dead coral, sand, and under rock.

Baluran National Park, distribution, diversity, Holothuroidea, shallow waters

Rust disease caused by Puccinia arachidis is one of the most important diseases on peanuts. Ageratum (Ageratum conyzoides L.), spiny amaranth (Amaranthus spinosus L.), and coco-grass (Cyperus rotundus L.) had the ability to inhibit plant pathogens. The aim of the research was to obtain the weed extracts effective to control peanut rust disease. The three weeds were ground to obtain fine particles, macerated in methanol for 18 h and evaporated the solvent using vacuum rotary evaporator. Methanolic crude extracts obtained from ageratum, coco-grass, and spiny amaranth at concentrations of 0.1%, 1.0%, 2.5%, and 5.0% were applied to the urediospores and peanut plants infected with the pathogen. Applications of 5% ageratum and 5% coco-grass extracts suppressed the spore germinations of 78 to 80% and 76 to 80%, respectively. Disease intensities on Kancil cultivar treated with 5% crude extract of ageratum were 18 to 22% and 29 to 31% after three and four times of extract applications. Disease intensity on untreated plants were 30 to 32% and 43 to 46%, whereas the chemical application suppressed the disease intensities up to 16 to 18% and 15 to 17% at the same observation. Preliminary phytochemical screenings showed that the methanolic extract of ageratum contained alkaloids, flavonoids, tanins, saponins, and terpenoids. Crude extract of 5% ageratum was effective to control rust disease on peanuts, therefore, could be used an alternative control to suppress the disease.

A. conyzoides, A. spinosus, botanical fungicide, C. rotundus, peanut rust disease

Pattern of insect community associated with Santalum album

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Plants play an important role in the trophic levels. As a primary producer at the basal level, plants are in turn consumed by the organisms on the second trophic level, herbivores, as a primary consumer. This research was conducted using Santalum album Linn. which grows naturally in Nglanggeran, Gunungkidul. This research was conducted to determine the insect community in S. album and to determine the effect of variations of characteristics
of *S. album* flower. The research was conducted at the peak flower period in February 2015. The observation time was divided into three different levels: (i) anthesis, (ii) anthesis to late anthesis, and (iii) late anthesis. The insect community observation was conducted by direct sampling method, then all of insects found will be recorded. Identification of insect held at the Laboratory of Entomology, Faculty of Agriculture, University of Gadjah Mada, Yogyakarta. The influence of flowering phase to insect community was measured by ANOVA statistical analysis. Insect communities in *S. album* consist of 7 orders and 23 families, consisted of the second trophic level: Hymenoptera (consists of 7 families); Diptera (2 families); Hemiptera (3 families); Lepidoptera (5 families); Coleoptera (2 families); and Orthoptera (1 family), and the third trophic level: Hymenoptera (5 families); Diptera (2 families); Coleoptera (2 families); Coleoptera (2 families); and Odonata (1 family). Some insects were included into two trophic levels: members of the order Hymenoptera and Diptera. Flower abundance was significantly influenced Family Formicidae, Vespidae, Eumenidae, Syrphidae, Muscidae, Hesperiidae, Nymphalidae; while stratum affected the Vespidae, Eumenidae, Scoliidae, Hesperiidae, Pieridae, Nymphalidae.

Insect community, effect of flowering, trophic levels, *Santalum album*

**BO-09**

Natural regeneration of burnt peat swamp forest and burnt peat land in core area Giam Siak Kecil Bukit Batu Biosphere Reserve Riau Province and Its implication on conservation

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A designated forest with specific purpose in core area of Giam Siak Kecil, Bukit Batu Biosphere Reserve, is one of peat swamp forest areas where multiple fire occurred. This research aimed to analyze composition and diversity of vegetation, regeneration and similarity among different fire history of peatswamp forests, e.g. secondary peat swamp forest (HS), burnt peat swamp forest in 2000 (HT2000), multiple fire of peat swamp forest (HT2005, HT2010, HT2014) and agroforestry on burnt peatland (AF). HT2000 and HT2005 have different vegetation composition compared with HS. *Calophyllum macrocarpum* was the commonest tree species in HS, whilst Shorea was the commonest tree species in HT2000, HT2005, HT2010 and HT2014. Similarity index of Sorensen (IS) between HS and HT2000, HT2005, HT2010, HT2014 was relatively high (IS = 68.43%), meanwhile Sorensen index between HS and HT2000, HT2005, HT2010, HT2014 was considerably low (IS = 33.12%). Fire reduced tree diversity, which was indicated by low Shannon-Wiener diversity index (H’). H’ index in HS was 3.41, whereas H’ index in HT2000 and HT2014 were 2.89 and 1.63, respectively. There were 33 tree species found in forest only; and 68.43% of the species has zoochory dispersal mode. Dispersal mode of the species in different habitat need to be taken into account for conservation practices in core area of Giam Siak Kecil, Bukit Batu Biosphere Reserve Riau Province.

Seed dispersal, species composition, zoochory

**BO-10**

Mangrove succession in the restoration areas of Sembilang National Park, South Sumatra

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Mangrove conditions in the region under pressure and degradation from year to year. The main cause of mangrove destruction in the Sembilang National Park (SNP) is cultivation or manufacture of fish ponds, especially in the Banyuasin Peninsula, South Sumatra. The activities of these ponds have resulted in the degradation of mangrove, especially in greenbelt. The destruction of mangrove areas causes a decrease in the quality and extent of mangrove areas which result in the degradation of a variety of important functions. Damage to mangroves occur both at the regional, national and even up to the global level. The purpose of this research is to know the process of natural mangrove revegetation on former ponds. The composition of the type of vegetation that grows in the area of the former ponds in South Sumatra region SNP restoration consists of four species: *Avicennia marina, Avicennia alba, Rhizophora mucronata*, and *Portulaca villosa*. The most dominant species of mangrove revegetation of former pond is *Avicennia marina*.

Former pond, mangrove, restoration, succession, Sembilang National Park

**BO-11**

Association of epiphytic microalgae on macroalgae with macroalgae thallus form in Muara Binuangun Reef Flat, Lebak, Banten

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Assosiations of epiphytic microalgae on macroalgae with macroalgae thallus form in Muara Binuangun Reef Flat, Lebak, Banten
The research on the association of epiphytic microalgae with macroalgae thallus form have been conducted on April 30th-May 3rd 2015 in Muara Binuangeun, Lebak, Banten. The research purpose are to determined the abundance of epiphytic microalgae on macroalgae, and to analyzed the association of epiphytic microalgae with macroalgae form in Muara Binuangeun. Samples of epiphytic microalgae were taken from 4 stations, selected based on macroalgae presence. Epiphytic microalgae which attached to macroalgae surface were separated using shaking method. The water was then filtered twice, using sieves of 125 µm and 20 µm. Microalgae on 20 µm sieves were observed using light microscope. The associations between epiphytic microalgae and macroalgae form was tested using Chi Square test. Based on the results, Navicula was the most abundant epiphytic microalgae in Muara Binuangeun. The highest abundance of epiphytic microalgae were found in fleshy macroalgae with rough surface, which is Sargassum. Epiphytic microalgae that has associations with macroalgae form is Amphora, which has positively associated with foliose thallus form.

Association, epiphytic microalgae, macroalgae thallus form, Muara Binuangeun

BO-12
The availability of feed plants resources of Jalak Lawu (*Turdus poliocephalus stresemannii* Bartels.) in Mount Lawu

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Jalak Lawu or jalak gading (*Turdus poliocephalus stresemannii* Bartels.) is an iconic bird in Mount Lawu and reported that its distribution is limited to this mountain area. The bird population is likely to decline due to habitat destruction such as annual forest fire and poaching. This study aimed to determine the availability of its feed plants resources and bird abundance throughout different elevation in Mount Lawu as early stage of conservation effort. Square method and point count with seven stations based on altitude, namely 2.000, 2.2000, 2.4000, 2.6000, 2.800, 3.000 and 3.200 m asl, were employed to analyze distribution and abundance of feed plants and to measure the bird abundance. Data of feed plant were analyzed descriptively qualitatively. The results suggest that Jalak Lawu consume edible part (ripe fleshy fruits) of 9 obtained feed plants species of Jalak Lawu scilicet Polygonon chinense (herb), 5 species of shrubs *Rubus fraxinifolius, Rubus linaeus, Rubus niveus, Rubus chrysophyllus* and *Debregesia longifolia*, and 3 species of trees includes *Vaccinium varingiaefolium, Photinia integrifolia*, and *Myrsine avenis*. All species of feed plant has clustered distribution pattern and each distributed at intervals of different elevation. Only Polygonon chinense are distributed in widest area (2.000-3.200 m asl) and has the highest individual abundance. Elevation of 2.200 m asl has higher density of feed resources with 6 species of plants but bird abundance found most intens at 2.600 m asl which has lower feed plants diversity (5 species). Jalak Lawu is likely to move in habitat with abundant food resources, but the activity is also influenced by competitor species.

Diversity, feed plants, Jalak Lawu, Mount Lawu

BO-13
Plants diversity of the deforested peat swamp forest of Tripa, Indonesia

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The purpose of the present study was to evaluate the plants diversity of the Tripa peat swamp forest in Aceh Barat District, Indonesia. A quadratic method was employed in this study. Determination of the square area was carried out based on the curve of minimum area. The result showed that there were 41 species of herbs with diversity index ranging from 1.8785 to 2.4180 classified as low to moderate categories. A total of seven species of shrubs and 24 species of trees were found at the locations with diversity index (H) ranging from 1.5186 to 1.7496 and 2.1713 to 2.9133 respectively, indicating the diversity of shrubs was in the low category, while the diversity of tress was in the moderate level. It is concluded that the diversity index of herbs and shrubs were in the low category, while the tree groups was in the medium category. According to the diversity index and direct observation of the Tripa peat swamp forest, this area has been degraded due to land conversion.

Deforestation, flora, peat swamp forest

BO-14
Total phenolic, flavonoid content and antioxidant activity of cultivated tabat barito (*Ficus deltoidea*) on various level on age

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The associations between epiphytic microalgae, macroalgae thallus form have been conducted on April 30th-May 3rd 2015 in Muara Binuangeun, Lebak, Banten. The research purpose are to determined the abundance of epiphytic microalgae on macroalgae, and to analyzed the association of epiphytic microalgae with macroalgae form in Muara Binuangeun. Samples of epiphytic microalgae were taken from 4 stations, selected based on macroalgae presence. Epiphytic microalgae which attached to macroalgae surface were separated using shaking method. The water was then filtered twice, using sieves of 125 µm and 20 µm. Microalgae on 20 µm sieves were observed using light microscope. The associations between epiphytic microalgae and macroalgae form was tested using Chi Square test. Based on the results, Navicula was the most abundant epiphytic microalgae in Muara Binuangeun. The highest abundance of epiphytic microalgae were found in fleshy macroalgae with rough surface, which is Sargassum. Epiphytic microalgae that has associations with macroalgae form is Amphora, which has positively associated with foliose thallus form.

Association, epiphytic microalgae, macroalgae thallus form, Muara Binuangeun
The aim of this research was to evaluate the total phenolic (TPC), flavonoid contents (TFC) and antioxidant activity of leaf extract tabat barito (Ficus deltoidea Jack.) that cultivated in glass house and in the field (Fd) on various level on age (6, 9 and 12 months). Different water field capacity on planting media in Glass house: W1 (100%), W2 (80%), W3 (60%) and W4 (40%) respectively used to estimate the TPC, TFC and antioxidant activity. Total phenolic content was estimated using Folin-Ciocalteau’s reagent, total flavonoid content by aluminium chloride colorimetric method and the antioxidant activity by the DPPH (2,2-diphenyl-1-picryl hydrazyl) method. The highest TPC (66.667±0.001 g gallic acid equivalents (GAE)/mg extract) of leaf extract found on W3 at 12 month old and the lowest (12.593±0.002 g GAE/mg found on W1 at 6 months old. F.deltoidea that cultivated in glass house (W4) and in the field (Fd) have the highest TFC 382.051±0.008 and 371.795±0.003 g catechin equivalents (CE)/mg extract respectively. Based on the DPPH assay, the IC$_{50}$ Fd (31.763±0.049 g/mL), W1 (57.556±0.047 g/mL), W2 (48.828±0.055 g/mL), W3 (58.473±0.065 g/mL) and W4 (34.473±0.066 g/mL) showed that the leaf extract F. deltoidea have strong antioxidant activity at 12 months old as compare to 6 and 9 months old.

Antioxidant, cultivated Ficus deltoidea, flavonoid, phenolic

**BO-15**

**The density, composition, and mangrove forest habitats in coastal areas of Torosiaje Jaya Village of Popayato Sub-district, Gorontalo Province**

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The ecosystem of mangrove is quite a good ecosystem which is located in Toroseaje village of Popayato Sub-district, Pohuwato District of Gorontalo Province. This because of the beach in the coastal of Toroseaje village is a gently sloping beach. Further, this beach has deposited sediment and it is formed a promontory grave that causes that mangrove in that region grows large and relatively fertile. In addition, the mangrove which is located in Pohuwato has fairly high various species. One of them is found from Avicenniaceae family namely *Avicennia marina* (Forsk.) Vierh. This study aims to (i) obtain the information about the density of the mangrove; (ii) to determine the composition of mangrove species in coastal areas of Toroseaje Jaya village; and (iii) to know the habitat of the species which is found in coastal areas Toroseaje Jaya village. Besides, the data were collected by purposive sampling. Moreover, for the measurement of density, distribution type, diameter trees, and mangrove vegetation height use a distance method (Point-Centered Quarter Method). Further, the composition types of views is based on the number species are found, and to obtain the data of the habitat conditions of the species which has discovered is using a direct observation in the field by a tree and laboratory test sample originating from soil samples in the study sites. Moreover, the result of this study finds the four species of tree which dominate the mangrove in Toroseaje Jaya village. They are Bruguiera gymnorrhiza, Rhizophora mucronata, Rhizophora apiculata, and Rhizophora stylosa with a density value of 51.55 trees/3 ha with an average distance of 581.94 m/tree. Bruguiera gymnorrhiza and Rhizophora mucronata are species that dominate in the region due to supply mud as suitable habitat with its growth, besides it is affected by the substrate of mangroves in the village Toroseaje Jaya it is also affected by salinity and temperature. Further, the data which have obtained, they can be used in a management of mangrove forest which located in the coastal of Toroseaje and they can also be data in mangrove conservation efforts in order to reduce the effects of global warming.

Composition, density, habitat, mangrove forests

**BO-16**

**Effect of age differences in the presence of dung beetles**

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Dung is a necessity for the survival of the dung beetles. However, only the dung with certain characteristics that are favored by the dung beetles. This study aims to determine the dung with what age the most widely visited by the dung beetles. The study was conducted in laboratory using methods olfactometry with five repetition and used three kinds of traps are respectively fitted with the treatment of dung beetle was the fresh ones. It can be concluded that the dung of the most widely visited by the dung beetle was the fresh ones.

Difference age of dung, dung beetles, olfactometry
BO-17

Macroinvertebrate diversity in Water Quality Assessment of Winongo and Gajah Wong Rivers, Yogyakarta Special Region

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Winongo and Gajah Wong are primary rivers in Yogyakarta Special Region, Indonesia. Both rivers have important role for society and surrounding areas. Thus, periodical river monitoring is needed. One way to monitor river is by utilizing macroinvertebrate diversity. This research aimed to study macroinvertebrate diversity and to analyze the water quality of Winongo and Gajah Wong rivers. Data was collected at upstream, middle, and downstream zones of both rivers, 100 m each, by using kick-sampling method. Diversity and abundance of macroinvertebrates was analyzed. The results showed that the number of macroinvertebrate families in Winongo was 24 while in Gajah Wong was 26. The highest diversity was in the upstream of Winongo river with diversity index score 2.411 while the lowest index was in the middle zone of Gajah Wong river with diversity index score 1.205. Both scores of Family Biotic Index (FBI) and Biotilik Index of Winongo river upstream was the highest with scores 4.64 and 2.89, respectively. The lowest score of FBI was in Winongo river middle zone with score 8.19 while the lowest score of Biotilik Index was in Gajah Wong river middle zone with score 1.29. From this research, it could be concluded that Gajah Wong river had higher macroinvertebrate family diversity than Winongo river and it could be implied that Winongo river upstream had the best water quality while Gajah Wong river middle zone had the worst.

Diversity, Gajah Wong, macroinvertebrates, water quality, Winongo

BO-18

Diversity of morphological and physiologically endophytic entomopathogenic fungi from peanut plant

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Endophytic fungi from peanut plant can be as entomopathogenic. The purpose of this study was to determine morphological and physiology the endophytic entomopathogenic fungi associated with peanut plant. The research was carried out in the Biological Control Laboratory, Faculty of Agriculture Andalas university from May to November 2015. Peanut plant samples were taken from Tanah Datar Sumatra Barat. This study used the exploration method by isolating endophytic fungus from the leaves, leaf stalks, stems and roots of peanut plants. The phathogenic test of fungal isolates was conducted to the fifth instar larvae of Tenebrio molitor and sporulation was identified macroscopically and microscopically and also the growth rate of the colonies, the conidia population. Based on identification it was found endophytic entomopathogenic from peanut plants. Colonization of endophytic fungus was highest in leaf stalks and leaves (82.40 and 80.52%).

Biocntrol, colonization, endofitic, entomopathogen

BO-19

Odonata diversity in Rawa Bendungan, Cilacap, Central Java

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Odonata can be used for bioindicator of aquatic and terrestrial ecosystems. Rawa Bendungan which is a well known tourism site in Cilacap, Central Java is also used for irrigation and fishing site. The aim of this study is to learn the diversity of Odonata in Rawa Bendungan. This study was conducted at six observation points in January and February 2016. The result showed that 18 species from 3 families were found at the observation site. Species of Libellulidae and Coenagrionidae were the most observed, while only one species of Gomphidae, Ictinogomphus decoratus, was observed. The species observed were generally tolerant of pollution.

Diversity, odonata, Rawa Bendungan

BO-20

Some species of the Genera Cobbonchus Andrassy, 1958 and Mylonchulus Cobb, 1916 (Nematoda: Mononchida) from South Kalimantan

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The present study is a part of a nematode biodiversity inventory project in South Kalimantan. Three known species of mononchids belonging to the genera Cobbonchus Andrassy, 1958 and Mylonchulus Cobb, 1916 are described from ricefields and peatlands in Kabupaten Banjar, South Kalimantan, viz. Cobbonchus indicus Baqi, Baqi & Jairajpuri, 1978; Cobbonchus mauritianus
(Williams, 1958) Clark, 1960; and Mylönchulus brachyuris (Butschli, 1873) Cobb, 1917. These are first records of occurrence of the three species in the Province of Kalimantan Selatan and probably in Indonesia. Morphological characters of M. brachyuris generally fit the original description of the species. Meanwhile, the characters of specimens of C. indicus and C. mauritianus show some discrepancies from the corresponding published descriptions, but are here considered intraspecific variations.

Description, identification, Monochida, predatory nematodes

**BO-21**

Georeferencing orchids specimen history cards in Bogor Botanic Gardens to increase their use for conservation efforts

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Orchids are considered valuable plant resource but overharvesting and habitat conversion have threatened their population. Bogor Botanic Gardens, West Java (Kebun Raya Bogor-KRB) stores millions of plant specimens taken from the wild or captivity. Origin of specimens are recorded in specimen tags and cards, where each of these can be converted to species occurrence datum for investigations of biodiversity, its relationship with the environment, evaluating conservation efforts and anthropogenic disturbances along spatial or temporal scales. However, data from tags and cards available are often not sufficient because localities have typically being recorded as textual descriptions, without geographic coordinates, thus making analysis using Geographical Information System (GIS) tools difficult. In this paper, we reviewed the use of online resources (i.e. GoogleMaps™, ProtectedPlanet.net, OpenStreetMap and OpenSeaMap) for georeferencing specimen cards and Quantum GIS as a GIS tool to store and display the data. Specimen cards from chosen genera of orchid in KRB were reviewed. The georeferencing process encountered several obstacles, includes: geographically biased locations, changes in spatial-administrative borders, unregistered location name, unavailability of location name in online resources, and typographic errors during specimen recording process. We also encounters quality difference along georeferenced records, some are good quality (i.e. record coordinates or nearest village) and some are poor (only record the provinces). Georeferencing is an underappreciated task, but once it is done, it can be used for future expeditionary research, national conservation planning, species status review, and other large scale analysis for both spatial and temporal scales.

Bogor Botanic Garden, georeferencing, orchids, plants, specimen collections

**BO-22**

Rediscovery of Fagraea litoralis (Loganiaceae) in Mount Nglanggeran of Baturagung Mountains Yogyakarta

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Fagraea litoralis population were found in the side of Mount Nglanggeran track in Yogyakarta. Identification was based on the literature and herbarium specimens. The study was conducted through continued exploration and examination using specimen collection. The existence of F. litoralis in Java described in Flora of Java by Backer and Bakuizen (1965) were minimum. F. litoralis life in the form of liana creeping large stone. Characteristic for identification of the initial plant are ovate to ellipsoid leaves, opposite, thick, grayish green color, flower shape of a bell-trumpet, flowering around March, colors yellow, corolla tube about 5-8 cm. This paper presents important morphological characteristic, namely leaves, stems, flowers, and fruits. F. litoralis were found on mount Nglanggeran of Baturagung mountains Yogyakarta. Recognition and awareness of this plant were needed for its potential, benefit and conservation of this species.

Fagraea litoralis, Loganiaceae, Mount Nglanggeran, Baturagung mountains

**BP-01**

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 controller, and guano fertilizer producer. The study aimed to observe bats’ existence and identify bats’ characters in Mount Walat. 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 pusillus and Rhinolophus affinis), and Hipposideridae (Hipposideros larvatus) in Schima wallichii stands. Cynopterus brachyotis was the most recorded bats during the research.

Bats, Chiroptera, Morphometric, Mount Walat

**BP-02**

**Early growth of three Dipterocarpaceae species under rubber plantation in North Bengkulu District, Bengkulu Province**

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Dipterocarpaceae was the most dominant tree family in the forest of Sumatra and Kalimantan, so the forest was called dipterocarp forest. However, the massive forest exploitation for several decades have depleted most of the dipterocarpaceae from the forest because the dipterocarp trees have high economic value. Not only dipterocarp trees, but also many other forest tree species have disappeared because much of the forest have been converted into single species plantation. The objective of this study was to plant three dipterocarp species, namely Shorea javanica, Shorea macrobalanos and Hopea mangarawan, under rubber plantation. The study has been conducted in Pondok Kelapa Sub-district, North Bengkulu District, Bengkulu Province, Indonesia since February 2015 up to the present. Thirty seedlings for each species were planted regularly, with planting distance of 2 x 2 m² under Hevea brasiliensis stand. The height and diameter of plants were measured every month. The data were analyzed statistically to know the difference growth among the three species. Within a year, Shorea javanica grew 8.6 cm in height (68% of the original height) and 2.2 mm (72%) in diameter, Shorea macrobalanos 20 cm (89%) and 4.4 mm (217%), and Hopea mangarawan 22 cm (62%) and 3.6 mm (87%). There was statistically difference in diameter growth among species but there was no statistically difference in height growth among species. During severe drought of 2015 some seedlings died.

Dipterocarpaceae, Hopea, rubber plantation, Shorea

**BP-03**

**Variability on morphological characters of pod associated with pod shattering resistance in soybean**

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Pod shattering is one of the major problems associated with soybean production during dry season in Indonesia. The objectives of the study were to classify the varietal difference of pod shattering and to identify the morphological pod characters related to pod shattering. The field study was carried out in Blitar (East Java, Indonesia) during the dry season 2015. Six morphological traits of pod were studied for their association with pod shattering resistance in 30 soybean genotypes. The results showed significant differences between genotypes for all characters studied. The degree of shattering resistance differed among genotypes. Shattering percentage ranged from 2.50% (G511H/Argom/Argom-2-1) to 100% (Grobo) with mean of 30.05%. Based on grouping of screening for pod resistance, there was no very resistant variety to pod shattering. However, 13 genotypes were found to be resistant, 11 genotypes were moderate, 1 genotype was highly susceptible, and 5 genotypes were very highly susceptible. The direct effects of the pod wall thickness and pod length on shattering percentage as indicated by path coefficient were the highest, while other causal effects were small. These characters (pod wall thickness and pod length) play role as determinant factors in pod shattering resistance. Therefore, soybean resistance to pod shattering could be enhanced by increasing thickness of the pod wall.

**Glycine max; pod characteristics; pod shattering; resistance**

**BP-04**

**Variability of pod trichome’s density and length on several soybean genotypes**

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Trichome potentially act as a plant defense against soybean pod feeders, hence, the identification of trichome variability on soybean pod become increasingly important. A total of 150 soybean genotypes were identified for its pod trichome length and density. The experiment was conducted from February to June 2014. All soybean genotypes were planted in Muneng Research Station, Probolinggo (Indonesia). Identification of trichome length and density was performed in Laboratory of Biology, Malang State University, East Java. Soybean pods were taken from the third nodes at R7 stage. Soybean yield, pod trichome length and density were grouped using cluster analysis. The days to maturity varied from 72 to 83 days (average 77 days), 100 seed weight ranged from 12.50 to 23.50 g (average 16.50 g), seed yield ranged from 1.51 to 4.28 t/ha (average 2.90 t/ha), pod trichome length varied
from 56.942 to 176.479 µm (average 112.82 µm), and trichome density ranged from 12 to 59 per 4 mm² (average 27.64 per 4 mm²). Cluster analysis on 150 genotypes based on yield, trichome length, and trichome density classified soybean genotypes into five major groups. The first group consists of 61 genotypes, and characterized by sparse trichome. Cluster II consists of genotypes with short trichome, whereas cluster III characterized by medium trichome length and trichome density. Cluster IV and V, each consists of six genotypes, and characterized by densely and longer trichomes, respectively. There was no significant correlation between trichome density with trichome length, however, makes it difficult to find genotype with long and dense trichome. The genotypes from cluster IV and V could be used as gene source for further improvement of trichome length and density in soybean.

Density, Glycine max, length, trichome

BP-05

The diversity and kinship of the swamp buffalo (Buffalo bubalis) Pampangan South Sumatra based on the characteristics morphologists

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Swamp buffalo (Bubalus bubalis) Pampangan in South Sumatra is one of the varieties of native buffalo native Sumatra. Characteristics of buffalo Pampangan that has a body shape tall and big, black leather, head and ears with long hair, short horns circular toward the back down, then towards the circular shape spirals, elbow-shaped body, a slim lead as the type of dairy cows, the udder well developed and symmetrical, and calm temperament. The research method is through direct observation of the morphology of each variant were found to swamp buffalo and then calculate kinship use NTSYS software ver. 2.1. Data quantitative as well as bust, high-shoulder, length of the body, long tail, length of the head, width of the head and high hips; while qualitative data are color hair, the shape, and direction of growth of horn is presented in tabular form. Observations conducted descriptive morphological characters that include the characters starting at the head, neck, body, tail and legs. Furthermore, the character gained will be given scale comparison of the numbers 0, 1, 2 and 3 in accordance with the character possessed of individual variants swamp. The results showed that there are four variants of swamp buffaloes in the area Pampangan, South Sumatra. The morphological characteristics of the fourth variant of Buffalo is body size, hair color and the shape and direction of growth of the horn. The phylogenetic relationships found in swamp buffalo Lampung and black variants. The correlation coefficient between 0.57 to 0.8 5 an indication of the closeness between variants. Similarity values more than 0.5 indicate variants derived from a common parent.

Diversity, kindship, NTSYS software, swamp buffalo

BP-06

Variability of lateral shoot and root formation of in vitro culture of sengon (Paraserianthes falcataria)

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Sengon (Paraserianthes falcataria L. Nielsen) is one of the fast growing tree species, which is economically important as multi purpose source of various wood-based product. In order to obtain of high quality seeds that powerfully supports the productivity of the forestry sector, in vitro propagation of sengon of commercially and superior seeds sources was developed using stem segment as en explant. The aim of this study was to determine the growth response particularly lateral shoot and root formation of regenerates stem segment explant of different types of seeds source on MS hormone free medium. The growth response of three types of 5 months old plantlets was identified in SI (commercial seed), SII (collected from superior tree), SIII (collected from superior tree). In general, comparable growth response in term of plant height and vigor was observed in three types of plantlets. The plantlets of superior tree as seeds source (SII and SIII) indicated lower values (16.9% and 66.67%) in lateral shoots formation compared to SI (69.23%). Sengon plantlets of SIII shown the highest rate formation (85.71%). Plant formed lateral shoots (branches) that initiated in the axil of the leaves or stem nodes. The growth of axillary meristem in most plants is initially controlled by the shoot apical activity. Decreased branching has been one of the major traits to be selected of tree species cultivation to support high quality wood production. It needs further field evaluation of the lower shoot lateral production of SII and SIII in association with high quality seedlings selection.

In vitro, lateral shoot, Paraserianthes falcataria, sengon

BP-07

Development potential of Citrus cv. Nimas Agrihorti as biopharmacy citrus

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Citrus cv. Nimas showed the fast growing and suitable for the use of Citrus plantlets as in vitro biopharmacy process. In vitro, lateral shoot and root formation was identified in SIV and V and SIII plants. The highest level of rate formation was in cluster SIII (94.69%). The genetic distance between SIV and V (25.60%) and cluster III (52.01%) were the closest. The quality of plantlets (CIV and V) showed the high level of vigour, and the genetic diversity of SIV and V (23.69%) and SIII (30.51%). Citrus cv. Nimas could be used as the source of Citrus genotypes in vitro biopharmacy process.
Nimas Agrihorti is a citrus crop suitable to develop in Indonesia in order to fulfil the needs of bio pharmacy citrus in domestic markets. This is based on a high quality of Nimas Agrihorti that is considered able to play as the raw material for bio pharmacy industry as more people concern of their health necessity. The objective of this study was to acquire some information of the superiority of Nimas Agrihorti’s characteristics and potentials as bio pharmacy citrus. The methodology used was by examination and observation conducted on June 2013-October 2014 at experimental field of Banjarsari, Bayeman village, Probolinggo in East Java. Morphological observation of the crop’s performance was done based on Descriptor List for Citrus (IPGRI), whereas characterisation of fruit’s chemical nature was done at the Post Harvest Laboratory of Brawijaya University, Malang, East Java. The results showed that according to the physical quality (size, colour and taste), Nimas Agrihorti has potential competitive advantages for development. It has big-sized fruit of 72-82 g in weight, yellow skin colour, sweet taste, 34.8 mg/100 g of vitamin C content and low acid content of 0.45%.

**BP-08**

**Typical of mangrove forests in lagoon areas of southern coast of Java, Indonesia**

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The rivers on the south coast of Java is forming lagoons at the estuary. The size of lagoon is generally not extensive and tend to dry up in the dry season. The mangrove forest is still found in the lagoons, as either a relic habitat or new replanting. This study aimed to determine the forest profile of mangrove in lagoons of the south coast of Java. The study was conducted in the estuary of Bogowonto and Opak rivers, Yogyakarta, Indonesia on November 2015. The results showed that *Avicennia* and *Rhizophora* is the dominant species in both places. Forest profiles diagram showed that *Avicennia* grows better than *Rhizophora* with higher size. This contrast with the growth of mangrove forests in estuaries of large rivers in Sumatra, Kalimantan and Papua where *Rhizophora* grows higher than *Avicennia*. This is a form of local adaptation where *Avicennia* grows better than *Rhizophora* on the environmental conditions of water shortages.

Drought, forest profile, lagoon, mangrove, Southern Java

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**Diversity of ecosystem**

**CO-01**

The roles of community fruit garden (tembawang) on maintaining vegetation structure, diversity and standing biomass allocation: an effort on reducing carbon emission

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Fruit garden (tembawang) Desa Cempedak in Sanggau, West Kalimantan has been established by local community for their family mixed garden ~ >100 years. The families of 3rd generation were utilizing the tembawang for their needs of building materials, fire woods, rattan, vegetables, fruits, and traditions medicine. It is important to study how this tembawang play their role in maintaing forest structure, species diversity and stock biomass. In 2014, we studied this area for exploring the vegetation composition and their ability to stock biomass of the tembawang. Stratified Random Sampling was applied to the 6.69 ha tembawang area, which devided into three major land cover (mixed fruit garden, mixed rubber plants, and mixed with apik palm). We surveyed and sampled vegetation using transect methods purposively on each landcover, with sampling area consecutively for mixed fruit garden, mixed rubber plants, and mixed of fruit garden and apik were 1.52, 0.6, and 0.72 hectares. Results demonstrated that mixed fruit garden carry out higher tree composition, density, basal area, and maintain the largest above ground biomass per hectar compared to two other land covers. It maintain 49 tree species on diameter >20 cm and 51 species in the lowest strature in the forest structure. Interestingly, *Durio zibethinus* Murr. was a dominant species on all tree major land covers and hold the largest above ground biomass. The choice of fruit species on tembawang determine the capability of the land to sequester and stock carbon within trees, because the trees were standing in tembawang for longer time compared to production forest, tembawang provide other benefit to the nature

Above ground biomass, carbon stocks, lowland tropical forest, mixed fruit garden.

**CO-02**

Choosing native tree species for establishing manmade forest: A new perspective for sustainable forest management in changing world

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Establishment of tree plantation on degraded lands and forest clearly favoured some exotic species such as *Gmelina arborea*, *Acacia*, and *Eucalyptus*. High productivity, less harvesting time, and deeper silvicultural knowledge are the beneficial factor for choosing those exotics species. However, the use of a wide variety of native tree species becomes more significantly important in reforestation projects due to the greater biodiversity benefits and wider environmental services. This research was carried out as a multiyear observation and continuous experiment to value how native tree resources can be a prospective alternative in providing and supporting human growth and needs. The performances of two native Indonesian *Shorea* species, *Shorea leprosula* and *Shorea selanica*, were evaluated at a dipterocarp planting trial in two different sites in Indonesia. Growth data was obtained from 16 years old plots, twelve 100 m X 100 m square plots on mineral soils (Gunung Dahu Experimental Forest/GDEF, Bogor) and eight resembled plots on frequently flooded peat land (PT. Arara Abadi/PT. AA, Riau). Survival rates were varied, ranged from 36 to 77%, diameter at breast height from 13.7 to 24.9 cm, tree height from 10.8 to 16.9 m, mean volume from 0.119 to 0.567 m³/tree, and total volume from 79.420 to 215.412 m³/ha. Growth rates of planted saplings were affected by species, site and spacing distance. The market value of dipterocarps wood is about twice the value of exotic fast growing tree. Therefore, development of man-made native dipterocarps forest in the tropic, especially in South East Asia can be as prospective as developing an exotic fast growing plantation. Hence, establishing man-made dipterocarp forest can maintain and support the genetic conservation of the native species with lower to no risk of species invasion compare to those of developing exotic trees plantation.

Exotic species, native tree, plantation, Shorea leprosula, Shorea selanica

**CO-03**

The diversity of plant species, the type of plant uses and the estimate of carbon stock in agroforestry system in Harapan Makmur Village, Pondok Kumbang Sub-district, Central Bengkulu District

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Agroforestry system is usually found in traditional home gardens in rural areas in Indonesia, where a variety of agriculture and forestry plant species are grown in a mixed plantation. To some extent, the traditional home gardens resemble natural forest in vegetation structure and composition. The objective of this study was to know the diversity of plant species, the types of plant uses and the estimate of carbon stock in home gardens in Harapan Makmur Village, in Pondok Kumbang Sub-District, Central Bengkulu District, Bengkulu Province, Indonesia. The field work was conducted from April to May 2013. Data of plant diversity were collected from sampling in quadrats, each measuring 10 x 10 m² for trees, 4 x 4 m² for shrubs and saplings, and 1 x 1 m² for herbs, with sampling intensity of 25%. A total of 23 home gardens were selected. The data recorded were plant species, plant diameter at breast height and types of plant uses. Data of plant uses were collected through interview. The data were analyzed to determine the diversity index, importance value index, estimate of carbon stocks, and types of uses. The results showed that 69 species of plants were found in the home gardens, with a Shannon-Wiener diversity index of 0.99 for trees. The most dominant species of trees was *Hevea brasiliensis* Willd (rubber tree) with an importance value index of 127%. For saplings (small trees) and shrubs, *Hevea brasiliensis* Willd was also the most dominant with 169 individuals, while for herbs, *Agrostis sp* was the most dominant species with an average coverage of 25.85%. The community used many plants species for several purposes: 41 for food, 11 for medicine, 21 for fire wood, 2 for handy craft, 4 for fences, 3 for forage, 13 for ornamental plants, 6 for shade trees, and 2 for coloring. Twenty three species were not used. The estimate of carbon stock in the trees was 81.32 ton/ha.

Agroforestry, home gardens, plant diversity, carbon stock

**CO-04**

Diversity of faunal communities in the Biodiversity Park of Aqua Danone Ciherang, Bogor, West Java

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A Biodiversity Park is a new method for ex situ conservation in Indonesia. The concept was first launched in 2012. The purposes of a Biodiversity Park are to conserve indigenous and threatened species of flora, provide habitat for a diversity of animal life, and to provide local residents with opportunities for economic benefit, recreation, education and research. One of the goals of Biodiversity Parks is to improve the diversity of flora and fauna in the midst of human settlement and industrial precincts. This research was directed at studying the diversity of faunal communities in the Biodiversity Park of Aqua Danone Ciherang, Bogor. Line transects, walk transects, terrestrial transects and point count methods were
combined to census the mammals, reptiles, amphibians and birds in the Biodiversity Park. Twenty five families of fauna were identified, consisting of 28 genera and 32 species. The Shannon diversity index for the total faunal community was 2.82. Composition of the faunal community consisted of birds (66%), reptiles (16%), mammals (12%) and amphibians (6%). This finding supports the concept that Biodiversity Parks can successfully provide habitat for diverse fauna. The diversity index of 2.37 for the bird community indicates a beneficial contribution to habitat quality within an urban environment.

Biodiversity Park, fauna, habitat, green space

**CO-05**

**Ex situ conservation of North Sumatran Mountain Flora at Samosir Botanic Garden**

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The tropical rain forest of Sumatra with its richness of biodiversity was designated as a world heritage location by UNESCO in 1992. However, degradation and deforestation has continued, causing significant biodiversity loss. Therefore, in situ conservation through the establishment of protected areas is not enough. Another strategy of conservation action, in parallel and synergy, is needed to protect biodiversity from extinction. Ex situ conservation through development of local botanic gardens is another solution to protect native flora, particularly, endemic species from extinction. Samosir Botanic Garden was established in 2010 by the decree of Samosir Regent no. 19, to cover an area of 100 ha. It has aims to conserve the mountain flora of North Sumatra. The method for development of Samosir Botanic Garden includes planning, implementation, monitoring and evaluation. Exploration of the mountain forest of North Sumatra is being carried out to collect local, rare and endemic flora. The collections are being planted at the Garden. By the end of 2015, Samosir Botanical Garden already had a collection of 99 species of flora planted out in the Garden. Another 155 species are still being prepared in the nursery. The planting concept is designed according to thematic gardens, such as a Batak Ethnobotany Garden, a Mandailing Natal Garden and an Orchid Garden. Besides being a conservation area, Samosir Botanic Garden also functions for research, education and ecotourism. This is in line with the national program that has declared Lake Toba to be a National Strategic Area (Kawasan Strategis Nasional) as a tourist destination and as a proposed Geopark.

Conservation, flora, ex situ, Samosir, Botanic Garden

**CO-06**

**Climate-induced hydrological changes and the ecology of freshwater Biota: A review**

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Climate change is believed to pose adverse effects to biodiversity of aquatic systems, both in boreal and tropical areas. The tropical freshwater systems are expected to suffer more severe impacts of climate change, from heavy floods or extended drought than do the boreal areas. Unfortunately, next few decades species extinction is suggested as dark future as we lack researches uncovering how climate change changes the aquatic biota. Therefore, a comprehensive understanding of biota’ performance in face of climatic pressures, will guide the further necessary researches. This paper presents a review on the available researches addressing ecological effects of the most influential climatic parameters, flood and drought, on freshwater biota.

Biot performance, climate change, drought, flood, freshwater ecosystem

**CO-07**

**Status of population, occupation and seasonal habitat displacement of alien bird species in West Java tropical forest**

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“Invasive species”, an alien species is defined as one “that is not native” to a particular ecosystem. One cause of a species alien species is introduced intentionally or unintentionally. Trade of animals including birds, indicating the cause of alien species in several regions in Indonesia. it is suspected as the discovery of a population of Finch-billed Myna “Scissirostrum dubium” Latham 1802” in the forests of Western Java as a result of the indirect influence of the bird trade. Finch-billed Myna is one of many birds endemic in Indonesia. In 2006, this bird categorized as threatened species by IUCN. As far as we know, finch-billed Myna is resident bird in Sulawesi island and surrounding. CITES entered it as least concet species because few information about population and distribution. The other hand, We found them in Tangkuban Parahu Mount area. The population of Finch-
billed Myna In Tangkuban Parahu Mount is 17-24 individu of three group colonies. The occupation areas are Abria, Awi leuga and Manggu. The vegetation density higher at Myna’s former habitat (0.055 ind./m²) and Myna’s recent habitat (0.028 ind./m²). Vegetation of Myna’s recent habitat have good resources as resting site, feeding site, and perching site of dead trees that Myna’s former habitat.

**CO-08**

**Biological treatment with consortia of Mn²⁺ and Fe²⁺ oxidizing bacteria from alfisol Jumantono for groundwater purification**

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Biological oxidation process was proposed as an alternative method for water purification. The study aimed at elucidating bacterial consortia that were potential to be applied as effective biological oxidants on the separation of Mn²⁺ and Fe²⁺ in groundwater purification. Three steps of method were conducted. The first was isolation of Mn²⁺ and Fe²⁺ oxidizing bacteria from the precipitation layer of Mn and Fe and from groundwater of Alfisol Jumantono. The second was examination of the oxidation type of the isolates of Mn²⁺ oxidizing bacteria, and the third was investigation of the oxidation capability of the consortia of Mn²⁺ and Fe²⁺ oxidizing bacteria in the simple design of groundwater purification process. The results showed that the consortium of Mn²⁺-oxidizing bacteria with oxidation type III indicated the highest capability in Mn oxidation compared with the types I and II, whereas the consortium of Fe-oxidizing bacteria of Leptothrix strains indicated higher capability in Fe oxidation than Sphaerotilus strains. The decrease of soluble Mn in all treatments did not reach to the allowed level for drinking water. The decrease of soluble Fe in all treatments with application of Leptothrix strains reached to the allowed level of 0.25-0.28 mg/L. Combination of consortia of Mn²⁺ and Fe²⁺-oxidizing bacteria indicated decreasing soluble Mn and soluble Fe at the same level with the results from consortia of Fe²⁺-oxidizing bacteria only. It could be concluded that the effect of Mn²⁺-oxidizing bacteria was minor compared to the effect of Fe²⁺-oxidizing bacteria.

Biological treatment, consortia, Fe²⁺ oxidizing bacteria, groundwater purification, Mn²⁺ oxidizing bacteria

**CO-09**

**Effect of arbuscular mycorrhizal inoculum originated from Surakarta Area and rock phosphate toward P uptake of corn on alfisol Jumantono**

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The effectivity of arbuscular mycorrhiza (AM) as biofertilizer are determined by internal characters of AM and various environmental factors. The effectivity of AM is not always parallel with their infectivity in plant root. The present research aimed at elucidating the infectivity and effectivity of arbuscular mycorrhizal (AM) inoculum originated from a variety of soil types in Surakarta and the effect of rock phosphate with two dosage levels toward P uptake of corn on Alfisol Jumantono. The research was conducted in greenhouse by applying AM inoculum from: Andisol Tengaran, Alfisol Jumantono, Entisol Mojosongo, Inceptisol Bengawan Solo, Vertisol Jatikuwung, and rock phosphate with levels of dosage consisted of: 0 kg ha⁻¹; 682 kg ha⁻¹; 1364 kg ha⁻¹. The results indicated that AM inoculum from Andisol Tengaran showed the highest infectivity and effectivity comparing with inoculum from other soil sources. The treatment of rock phosphate with dosage of 682 kg ha⁻¹ resulted in the highest infection of AM and the number of mycorrhizal spores comparing with dosages of 0 kg ha⁻¹ and 1364 kg ha⁻¹. The interaction of AM inoculum from Andisol Tengaran and rock phosphate with dosage of 682 kg ha⁻¹ showed the highest infection of AM of 86.67% (38.3% higher than control), the interaction of AM inoculum from Entisol Mojosongo, and rock phosphate with dosage of 682 kg ha⁻¹ showed the highest available P₄O₁₀ 30.17 ppm (133.89% higher than control), and interaction of AM inoculum from Andisol Tengaran and rock phosphate with dosage of 1364 kg ha⁻¹ showed the highest P uptake of corn 1.13 g plant⁻¹ (151.11% higher than control). The correlation analysis test indicated that P uptake of corn was significantly correlated with the infection of AM (P-value = 0.000).

Alfisol Jumantono, arbuscular mycorrhiza, corn, P uptake, rock phosphate, Surakarta

**CO-10**

**Mangrove health index as part of sustainable management in mangrove ecosystem at Karimunjawa National Marine Park, Central Java**

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Monitoring the health of marine ecosystems is an integral part of sustainable management of the ecosystems including mangrove. Distribution and diversity of mangrove ecosystems are two important parameters in Mangrove Health Index (MHI). The index analyses the value of mangrove density, diversity index, index of uniformity and the number of mangrove species. This study investigates mangrove distribution and diversity to support sustainable management at Karimunjawa National Marine Park. Mangrove distribution maps were prepared using Satellite imagery GEO-EYE. Analysis of satellite imagery was carried out at several islands i.e. Cemara Kecil, Cemara Besar, Krakal Besar, Krakal Kecil, Cilik, Sintok, Menjangan Besar, Menjangan Kecil, Tengah and Karimunjawa with a total area of 3752 ha. These were followed by ecological surveys to analyse the diversity of mangrove. At five locations, namely Legon Cilik, Legon Gede, Kemujan, Karimunjawa and Menjangan Besar. Satellite image interpretation results showed that mangrove were found at island of Karimunjawa and Menjangan Besar. In total, 22 mangrove species identified, 12 species were true mangroves and the rests were mangrove associates. Rhizophora apiculata dominates three of nine survey locations, while Rhizophora stylosa was the dominant species in two of nine locations and the rest are dominated by Ceriops tagal, Lumnitzera racemosa, Rhizophora macronata and Sonneratia alba. In the category of tree (diameter > 4cm), mangrove cover ranging from medium to high, from 1400 to 2700 ind/ha. The highest and the lowest mangrove cover were found at Kemujan 2 (2700 ind/ha) and Legon Cilik 1 also Karimunjawa 2 (1400 ind/ha). In general, the Shannon diversity index was low. Mangrove in Legon Cilik 1 had the highest Shannon diversity index (1,09) while Menjangan Besar were the lowest (0,19). In the category of sapling (height>100 cm and diameter <4 cm), dominant mangrove species was relatively diverse. Mangrove cover ranging from low to high category (800-7200 ind/ha). The result also shows that the value of MHI at Karimunjawa was 200, which is in the medium category. The results suggest that there is a need to improve MHI as part of sustainable management based on distribution and diversity of mangrove.

Distribution, diversity, Mangrove Health Index, sustainable management, Karimunjawa Islands

Indigenous Kaliwu agro-ecosystem, biodiversity conservation and environmental service on Sumba Island, East Nusa Tenggara

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Indonesia is a mega-biodiversity country in biological resoucers and cultures. Biodiversity and cultures assimilation construct a various specific models on natural resource management, one of which is indigenous agro-ecosystem. Indigenous agro-ecosystem has a strategic value in support the national development, so it needs to be developed. The study aims to investigate the characteristics of Indigenous Kaliwu Agro-Ecosystem (IKAS) on Sumba island, and its role in biodiversity conservation and environmental services. Ethnecology approach, interviews and field observations is used, data analysis with descriptive and qualitative. The results of research showed: (i) IKAS has specific of biophysical characteristics that support the hills conservation, (ii) IKAS has a important role in biodiversity conservation, mainly as a habitat of 145 species of plants, and (iii) IKAS have environmental service benefits as a source of food, forage, timber and fuel wood. It was concluded that IKAS has biophysical characteristics with positive implications for the biodiversity of plants, and a varies of environmental service benefits for humans and nature conservation.

Agro-ecosystem, biodiversity, environmental service

CO-11

Isolation of Actinomycetes from mangrove ecosystem in Torosiaje, Gorontalo

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Actinomycetes are a group of gram-positive bacteria, known as a producer of secondary metabolites that important in the industrial world. The secondary metabolites have activities as antibateria, antifungal, antiviral, and anticancer. Actinomycetes are widespread in the environment of terrestrial, freshwater and marine environments. Actinomycetes in marine environmental studies, especially mangrove swamps still very little compared to the terrestrial environment. The research aims to obtain isolates of actinomycetes from mangrove plant rhizosphere sedimt in mangroves Torosiaje which will be an opportunity to explore secondary metabolites/bioactive compounds that support the industry. Research succeed to get seven isolates actinomycetes from five kind of rhizosphere mangrove sedimt, ie Ceriops tagal, Bruguera gymnorizha, Xylocarpus sp., Avicennia marina and Rhizophora apiculata.

Actinomycetes, mangrove, marine environments
Farmer adaptation strategy in paddy field affected by climate variability in monsoon regions

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Adaptation of agriculture cultivation to climate variability and climate anomalies both in paddy field especially in monsoon regions is a one of strategy to minimize impact of these two phenomena in order to reduce the economic lost, particularly for food security in Indonesia. The objectives of this study are: (i) to identify onset and cropping pattern in irrigated land, rainfed and dry land in affected area due to climate anomalies. (ii) to collate information of carrying capacity water resources and adaptation practices applied by farmers (iii) to identify strategies for farmers on irrigated land, rainfed and dry land in the region affected by climate variability. The desk work analysis and field survey were conducted in Serang District, Banten Province, Subang District, West Java Province and Pati District, Central Jawa. This study includes: (i) The corollation analysis climate anomaly and rainfall, (ii) field survey, (iii) analysis onset growing season, cropping pattern, water availability, the best planting time and irrigation schedule. The results showed that the farmers in affected area due to climate variability could adapt by shift the onset of growing season. Farmer in irrigated land shift their onset around 2-4 tandays period becomes October II-December II, in rainfed area around 4-6 tandays period becomes November I-January III and in dry land around 6-8 tandays peroid from November II-Februari I. The cropping pattern rice-rice-palawija/fallow was applied in irrigated land, rice-rice/palawija/fallow-fallow in rainfed and palawija-palawija/fallow-fallow in dry land. Adaptation programs to deal with climate variability in Serang and Pati varies more than in Subang. In Serang and Pati, during first growing season farmers applied irrigation roughly 20%-30% pump water from river and during second growing season, in Pati farmers use water from well pump and even in Serang reach 100%.

Adaptation strategy, climate variability, farmer, monsoon regions, paddy field

Management leadership in the promotion of village farmer softskill information technology in the Province of Gorontalo

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Government as a leader in protecting all people in developing economies in the region. Government with related parties should be able to prosperity and welfare of the community, in addition to master the administrative arrangements for the control of managerial competence, should be able to understand the functions of management, and also in the field of entrepreneurship. Leader in a management capacity must be at prop with social competence to be able to protect its people, especially the farmers. As a leader must master the science of management in the system of administration and control for setting the Class Action for farmers. Leader in advancing management function can run the policies and rules that have been agreed in the region. Management Leadership in soft skills coaching can be an underlying implementation of management functions, the concept of nurturing thought leadership and supported by information systems that can be directly received by farmers. For the province of Gorontalo, coaching by the Regional Head (Governor) to farmers in the implementation of the management functions of an underlying concept of leadership and leadership areas that: (i) Planning of the government in the form of socialization (ii) Organizing farmers through of scientific Forum. (iii) Mobilizing Farmers market competitiveness through (iv) Supervise the farmers with independence through increased resale value through the utilization of information technology. Commitment and consistent enforcement continues to be undertaken by the Government of Gorontalo province through the efforts and strategies to increase potential, productivity and innovation of the agricultural community, given the farming community has an important role Gorontalo be driving the regional economy and become identity regional pride. The data used is the survey data, the secondary and primary data were obtained in the field and study the results of previous research literature. It is built is through qualitative and quantitative data that are presented descriptively. The result of this research is the leader in the Guidance Management Forms Softskill Farmers through Utilization of Information Technology.

Information Technology, management leadership, soft skill development

The local knowledge of the rural people on species, role and hunting of birds: Case study in Karangwangi Village, Cidaun Sub-district, West Java

Johan Iskandar1,2 Yayan Apriyana, Budiawati Supangkat Iskandar3, Ruhyat Partasasmia4

Ethnobiology

DO-01

The local knowledge of the rural people on species, role and hunting of birds: Case study in Karangwangi Village, Cidaun Sub-district, West Java

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Most of the people in Giam Siak Kecil, Bukit Batu Biosphere Reserves still believe in traditional healers (dukun) to treat their disease. This research aims to: (i) describe plant species dukun practice, (ii) understanding the strategy dukun culture in maintaining its existence. This research located in Giam Siak Kecil Bukit Batu Biosphere Reserves and take the informants purposively, which consists of traditional healers and the people who went to the patient. Technique of collecting data doing through participation observation and in-depth interviews, while the data analyses by ethnographic and ethnobotany descriptive. The results showed, dukun practice exists because people still believe in the traditional medical. Dukun can treat medical and non-medical disease (such as form of jin interference and demons) with traditional ways such as prayer, water-filled prayers, potions from herbs, or pressing the nerve points on the body, and supernatural powers. Recorded 110 species of plants and more than 57 families are utilized for traditional medicine. Dukun also implemented several strategies to maintain the culture of the patient. Traditional medicine needs to be preserved because it is one of the local wisdom.

Dukun, traditional healers, traditional medicine

DO-03

Nature conservation through local wisdom: the role of sacred places in western slope of Mount Lawu in preserving rare trees

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Traditional knowledge and local wisdom of Javanese people offer alternative perception on ecological understanding, include the existence of sacred places in the preservation of rare plants. Mount Lawu is one of the most sacred mountain with a lot of historical sites. The aim of this study was to inventory the diversity of conserved plants in hieratic sites in western hillside of Mount Lawu. Interview key informants and households, and field observation were conducted to obtain data. In total we noted 16 hieratic sites scattered in western hillside of Mount Lawu that classified into four categories, i.e. shrines, springs, graves, and sacred trees. About thirty nine plants species were recorded around the hieratic places and among them there are 10 rare trees species. From this study we can conclude that sacred values could support the conservation effort because it prevents people to harm the environment.

Local wisdom, nature conservation, sacred places

DO-02

Ethnobotany of traditional healer (dukun) in Giam Siak Kecil Bukit Batu Biosphere Reserve Riau Province

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Based on the ecological history, in the past many villages of West Java had a high diversity of birds. Nowadays, however, the diversity of birds in some villages of West Java has tended to decrease due to many factors, including intensive illegal bird hunting which has been undertaken by some bird hunters. The objective of this paper is to elucidate the local knowledge of Karangwangi village, West Java on species, role, and hunting of birds. Method was used in this study is the qualitative with descriptive analysis which the ethnornithological approach is applied. Results of study show that the Karangwangi people have a very good knowledge on bird species, particularly on level species/species. Various bird species are traditionally classified into seven categories (folk classification), namely based on distinctive voice, characteristic morphology, special colour, momentary activity, special common habitat, nest characteristics, and role in the ecosystem. Based on the rural people perception, the role of birds can be divided into two categories, namely notorious and beneficial birds. The diversity of rural birds has tended decrease over time due to various factors, including illegal bird hunting for various purposes of the village people, such as keep a bird in cages and bird trading. The study suggests the perception of rural people on birds have changed caused of socio-economic and cultural changes. Nowadays the bird hunting in the rural area has tended to shift from a purely subsistence form towards a more commercial form and, thus, to conserve bird species the socio-economic and cultural rural people aspects might be integrated to national as well as international bird conservation programmes.

Bird classification, bird hunting, ethnoornithology, Karangwangi village, local knowledge
Cultivation of potato in mid elevation areas is challenging to fulfill the demand of seed potato which has increased in tropical countries. An experiment was conducted with the aims to (i) evaluate the physiological mechanism in breaking dormancy of potato tubers and (ii), to evaluate the effect of paclobutrazol on growth and yield of several potato varieties grown in mid elevation areas. Four potato varieties were used namely Granola-Pengalengan, Granola-Kopeng, Atlantik and Nadia. For dormancy breakage, potato seeds of 40-50 g were placed under cold (10°C) or mild temperature (25°C) and moist condition for 4 weeks. Number of sprout and shoot length was measured, α-amylase activity was determined by the Ceralpha amylase method, and hormones content were determined using HPLC. To analyze the effect of paclobutrazol on growth and yield of potato, all potato seed varieties were planted in the mid level field of 700-800 m above sea level, with day/night temperature range of 28°C to 31°C/22°C to 25°C. The soil was enriched with organic fertilizer (2.5 t/ha), SP36 (150 Kg/ha), urea (100 Kg/ha) and KCl (110 Kg/ha). Potato seeds were planted in a row with the distance of 30 cm between each tuber. Four weeks after planting paclobutrazol at concentrations of 0 ppm (control), 12.5 ppm, or 25 ppm was applied by spraying it to the plant and also as a soil drench. On week 8th plants were sampled and chlorophyll content was determined spectrophotometrically. Plant height, nitrate reductase activity, reducing sugar content, starch content, Vitamin C and potassium content in the tubers were also evaluated. The results showed that all four varieties of potato can grow relatively good on mid elevation areas having altitude of about 700 m above sea level and produced tubers that can be used either for seeds or for consumption. Tuber sprouting occurred 3 to 4 weeks after storage at 22-25°C. Potato tubers that were subjected to low temperature (10°C) had greater α-amylase activity compared to those seed potatoes stored at room temperature, but sprouting in low temperature was delayed for about 5 to 6 weeks compared to mild temperature (22-25°C). In germinating tubers, cytokinin was detected in all tuber varieties used in this experiment. The content of cytokinin in sprouting tuber of Granola-Pengalengan, Nadia and Atlantik was relatively similar, but for Granola-Kopeng the content of cytokinin was only one fourth of the content in other varieties. Auxin was only detected in tuber of Granola-pengalengan. The occurence of cytokinin in the tubers indicated that this hormone play a role in tuber development as well as tuber sprouting. Paclobutrazol treatment reduced the average of plant height; however, it tends to increase the total protein content. The number of new tubers, starch content, nitrate reductase activity and potassium content increased by paclobutrazol at 12.5 ppm or 25 ppm especially on Granola-Pengalengan variety. On the other hand, the content of vitamin C remained relatively similar in all varieties of either the control or paclobutrazol treatments. The Atlantic variety produced greater size of new tuber but the number of new tuber was less compared to other varieties examined in this research. It is probably due to the flower formation which occurred at the same time of tuber induction, thus competing for photo assimilates which then limited the formation of more tubers.

Dormancy breakage, growth, mid level area, paclobutrazol, potato

Effects of paclobutrazol on growth and yield of several potato varieties grown at mid elevation area

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In tropical region where the coconuts commodity as a back bone economy such as in Indonesia rearing cattle with local forages grown naturally underneath coconuts plantation is a systems widely practices. This paper is composed of information of several years of our consecutives results research (five filed experiment separately). In coconut plantation native forages and natural vegetation can’t survive under heavy grazing due to lack of grazing management practiced by farmers. This will lead to overgrazing, soil compaction and in some circumstances triggering erosion, changing in botanical composition due to invasive weeds, and disappearance of the planting forages species. This disappearance is also probably due to other factors such as intolerance of those species in the shaded environment. However, this is not the case. Although shade tolerance species are planted, the pasture run-down still occurs. To overcome this problem there are some new approaches. Defoliation should based on biogeochemical process consideration and should ensure the health of the grass subject to cutting. Abundance of CO2 due to climate change following by the increasing of air temperature, the time of defoliation or grazing should be focused on counting the accumulation of heat unit rather than focusing on forage’s age. Finally, appropriate grazing management should take into account, to ensure pasture to recover after grazing. It was concluded that interaction of rotational grazing with grasses at 3.5 rd mature leaves and paclobutrazol treatments.
the stocking rate at 2.31 AU gave the best pasture performance, botanical compositions, daily gain of cattle and improved the yield of coconut nuts.

Biodiversity, coconut, farming, new forage species

**EO-03**

**Stability of rhizobacterial isolate in some formulas to increase growth and yield of soybean in the field**

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Plant growth promoting rhizobacteria are a group of bacteria, that actively colonize plant roots, induce the resistance of plant to pathogen, increase plant growth and yield. Our previous research in greenhouse experiment had showed, the stability of some formulas of rhizobacterial isolates from soybean root effective to increase growth and yield of soybean. The aim of this research was to get the best carrier for formulation to maintain the effectivity of rhizobacterial isolate on storage to increase plant growth and yield of soybean in the field. The experimental was designed in complete randomized design where 16 treatments and three replicates with three plants/treatment for each variety was taken. The treatments were combination of material carrier for formulation of rhizobacterial isolate (peat soil, tapioca flour and coconut water + 1% palm oil) and time of storage of formula (0, 1, 3, 5 and 7 weeks) and control. Every formula of rhizobacterial isolate were inoculated on soybean seed as seed treatment. The parameter were observed include: the viability of rhizobacterial isolate in the formula during storage, growth development (germination rate, plant height, number of leaves and twigs), generative phase (time of flowering and pod) and yield (weight of seed) of soybean. The results showed that all formulas of rhizobacterial isolate were able to suppress the bacterial pustule on soybean. The best combination of rhizobacterial formula to increase growth and yield of soybean were four weeks stored of cassava flour and peat soil compare than control.

Field experiment, formulation, plant growth promoting rhizobacteria, soybean

**EO-04**

**The soil improvement potential of weeds in marginal land**

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A farmed soil that has been allowed to lie idle and grow up to weeds is more productive when cultivated again than it did before, because the presence of weeds building up organic matter and chemical contents of soil. This study aimed to assess the soil improvement potential of Chromolaena odorata, Mikania micrantha, and Synedrella nodiflora, also the best form of their practical application as green manures without fermentation in marginal land. Two forms of application, fresh and dried chopped, were examined in a pot experiment using soil from marginal land of Patuk, Gunung Kidul, and spinach (Amaranthus tricolor L.) as the test crop. These were compared to the control groups of pot without any soil amendments and one with anorganic fertilizer. The pots were laid out in randomized complete block with six replications. Laboratory analysis showed that manurial properties between the weeds were statistically similar. The highest organic C (38.77%) and N (3.4%) were found in C. odorata, while M. micrantha contained the highest level of P and K at 0.16 and 2.1%, respectively. Of the chemical contents considered, the content of all measured chemicals in experimental soil had increased after incubated with chopped weeds for two weeks, of which significant rise was detected on available K₂O from 3.33 to the average of 46.33 ppm. The growth and yield of spinach resulted from soil treated with chopped weeds were superior than that from untreated soil. However, there were no significant differences in the response of plants among the types of weeds used. Rather, better growth and yield of spinach resulted from soil treated with dried chopped. Spinach yields were 12.89 and 46.29% higher when treated with dried chopped weeds than that with the fresh ones and anorganic fertilizer, respectively.

Chromolaena odorata, Mikania micrantha, soil fertility, Synedrella nodiflora

**EO-05**

**Identification the components of fatty acid compounds on the seed of Leucaena leucocephala as the potential sources of halal lecithin base materials**

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Lecithin is one of the ingredients of food emulsifier that can be derived from animals, for example cows and pigs, or plants, such as soy. The extensive use of vegetable lecithin is still constrained by the availability of soy lecithin as the base materials. Therefore, the obscurity of lecithin products
often creates doubts among Muslim to consume foods containing lecinthin emulsifiers. This study was aimed to identify the components of fatty acids compounds in *Leucaena leucocephala* L. seeds as the alternative source of lecinthin base materials. Lecithin was extracted using chloroform-methanol, followed by GCMS tests with soy lecinthin compound as standard. The results showed that the seeds of *L. leucocephala* containing lecinthin fatty acid residues of 0.37, 14.4, 64.9 and 3.26% meristat acid, palmitic acid, oleic acid and linoleic acid respectively. Therefore, *L. leucocephala* seeds can be used as a potential source of lecinthin base materials.

Fatty acid, lecinthin, *Leucaena leucocephala*, seed

**EO-06**

Effect of genotype on sporofit formation from prothallus mass of the golden chicken fern (*Cibotium barometz*) in vitro

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The golden chicken fern, *Cibotium barometz* (L.) J. Sm., is one of an Indonesian tree fern that has been included in the Appendix II of CITES since 1976. Its rhizomes and hairs are an important export commodity used as medicine, but those parts of the plant still harvested from the wild. In order to conserve the species, Bogor Botanic Gardens has been collect and propagate the plant true in vitro sporof py culture. The best media for spore germination and development of the gametophytes of *C. barometz* were ½ MS. However the growth from gametophyte stage to form sporophyte stage is very late. Previous study indicate genotype is one of the important factor that control the sporophyte formation. The aim of this study is to observe sporophyte development of six genotype of *C.barometz* in vitro. The spore of six genotype of *C. barometz* (Cb, Cb1, Cb2, Cb3, Cb4, and Cb5) were used as explant using half strength Murashige and Skoog (1/2 MS) basal media. Mass prothallus of the spore culture were subculture in ½ MS basal media and incubated in room culture to induce sporophyte. The result shows the high sporophyte percentage (100%) were Cb, Cb1 and Cb5 genotypes, however, the highest number of sporophyte (mean 11.1 sporofit) was Cb5 genotype.

*Cibotium barometz*, genotype, medicinal fern, prothallus mass, sporophyte

**EO-07**

Production of β-Mannanase on porang potato by *Bacillus subtilis* LBF-005 and its potential for manno-oligosaccharide production

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A marine bacterium of *Bacillus subtilis* was cultivated in ASW medium contain NaCl and various mannan biomass as carbon source for mannanase production. The cells were grown in sub merged fermentation to study the optimum condition was evaluated. Endo-β-1, 4-mannanase is the key enzymes of the mannolytic system, which randomly hydrolyzing the β-1, 4-linkages within the mannan backbone releasing mannoooligosaccharides of various lengths. The maximum enzyme activity was obtained with porang potato as a substrate with concentration 1%. pH medium 8, and incubation temperature 50°C with an enzyme activity of 37. 7 U/mL. The mannoooligosaccharides product released by crude mannanase from potato porang were manose (M1), manobiose (M2), manotriose (M3), manotetraose (M4), and manopentaose (M5).

*Bacillus subtilis*, β-mannanase, mannan biomass, mannoooligosaccharides, porang potato

**EO-08**

Energy pathway in soil nematode food web under different cropping pattern of maize and legumes crop

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Soil nematodes occupied amount trophic levels and their acquired carbon and nutrient from three energy channels in the soil food web. The dynamics of the energy channels could be affected by the functional identity and stage of plant development. Objectives of this study is to analyze the dynamics of the energy channels in soil food web using soil nematode trophic group during the development of maize and legume crops at different planting patterns. Seven cropping patterns, mainly the monoculture of corn and legume crops at different planting patterns. Soil nematodes at the phase of flowering, fruiting and harvesting crops were sampled. The results found out the bacterivore nematode and herbivore nematode during the development of corn and legumes crop in all cropping
pattern, while the fungivore nematode group was found out in the intercropping of maize with soybean. Relative biomass of nematode herbivore increased in line with the development of the plants. At each stage of plant development for all cropping patterns, the relative bacterivore biomass higher than relative herbivore biomass. It was concluded that the process of decomposition and nutrient cycling of soil organic matter dominated by bacteria energy pathway and second dominant is energy pathway of root herbivores nematodes during the development of maize, soybeans, peanuts, and mung beans either in monoculture or intercropping.

Bacterivore, biomass, channel, dominant, herbivore

EO-09

Morphological variations and sex expression of gametophyte of Cibotium barometz under in vitro conditions

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Characters of gametophytes were shown to be phylogenetically significant. Study on fern gametophytes has become essential to complete morphological, ecological, reproductive and distribution knowledge. The purpose of this study was to observe morphological variation and sex expression of mature gametophyte of Cibotium barometz (L.) J. Sm. under in vitro conditions. Spores of six genotypes of C. barometz from Sumatra, Indonesia, were sown on sown in half-strength Murashige & Skoog (½MS) basal medium. After 11 weeks germination of spores, prothalli were obtained. The protalli were consisted of spatulate stage and young heart-shaped stage. Prothalli were subcultured on half-MS medium along with sugar (30 g/L) and Naphthalecanetic acid (NAA, 0.5 mg/L) where they multiplied successfully. After 8 months subcultured of prothalli, gametophyte were observed by choosing 100 gametophytes randomly of each genotype. Eight morphological types of adult gametophytes were recorded: (i) branching filament (male), (ii) ribbon-like shape (male), (iii) spatulate shape (male), (iv) heart shape (male, female, bisexual), (v) gemmiferous heart-shaped (asexual), (vi) long heart-shaped (male); (vii) gemmiferous long heart-shape (asexual, and (viii) gemmiferous irregular shape (asexual). It is presumed that there is a correlation between gametophyte size, shape and sex expression, and to be related to the population density, which significantly affects the sexual expression of gametophytes. It is also showed that gametophyte morphology is simply “too plastic” to be used in supporting species delimitation in ferns if the prothalli to be cultured in a heavy population density plastic” to be used in support species delimitation in ferns.

Cibotium barometz, gametophyte, sex expression

EO-10

Pathogenicity of entomopathogenic fungus Metarhizium spp. against predators Menochilus sexmaculatus Fabricius (Coleoptera: Coccinellidae)

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Metarhizium spp. is entomopathogenic fungus which has wide host range. Metarhizium spp. can not only infect insect pests, but can also infect beneficial insects such as predators. The pathogenicity of four isolates of Metarhizium spp. was investigated against Menochilus sexmaculatus predator. Isolates of Metarhizium spp. were isolated from rhizosphere of cacao, cabbages, chili and rubber crop. The experiment was conducted by treating the fourth instar larvae with an appropriate conidial suspension of 108 conidia/mL. The results showed that all isolates Metarhizium spp. were pathogenic toward beetle predator M. sexmaculatus. Mortality of larvae within 7 days after application of conidial suspension varied between 27.50 to 67.50% and there were statistically significant differences among the tested isolates. Metarhizium spp. had also a significant affect in reducing pupation and adult emergence of M. sexmaculatus to below 30% and 3%, respectively. These studies indicate that entomopathogenic fungus Metarhizium spp. was pathogenic to beetle predators, Menochilus sexmaculatus.

Beetle predators, entomopathogenic fungus, Menochilus sexmaculatus, Metarhizium

EO-11

Antioxidant potency of etanolic extracts of callus developed from carrot and tomato

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Carrot (Daucus carota L.) and tomato (Solanum lycopersicum L.) are high potential source of antioxidant compounds such as phenolics and carotenoids. The compounds are known to be able to protect human body cells and tissues from free radical. Callus cell culture from organs of plants as explants can produce secondary metabolite as source of antioxidants. This study was aimed to determine the potency of antioxidant activity of callus developed from the plant organ of carrot and tomato on Murashige and Skoog (MS) medium. Murashige and Skoog (MS) medium used in this study was variated at sucrose concentration of 30 g/L and 40 g/L, whereas the variation of 2,4-D concentrations was (0, 1, 2, 4 and 8) ppm. The

Carrot (Daucus carota L.), whereas the variation of 2,4-D concentrations was (0, 1, 2, 4 and 8) ppm. The
results showed that all of the samples were able to grow at 5-7 days after planting from different part of organ plants. The callus was then sub cultured and extracted using etanol. The etanolic extracts of callus of carrot and tomato were measured on their antioxidant activity using DPPH method. The IC_{50} etanolic extract of carrot was 1751.29 ± 4.00 mg/mL while etanolic extract of tomato was 620.56 ± 32.36 mg/mL. Cueretin used as standard has IC_{50} value of 2.85mg/mL.

Antioxidant, carrot, callus, tomato

EO-12

Study of gamma irradiation on the creating of mutant of local rice mentik susu variety

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Rice (Oryza sativa L.) is the most important food crop in Indonesia. The problem is the unavailability of rice producing high quality and high yield. The aim of research was to obtain rice mutant that producing higher yield and having short-lived. This study used gamma irradiation with 5 level which were: 100 gray (R1), 200 gray (R2), 300 gray (R3), 400 gray (R4) and 500 gray (R5). The experiment was conducted on agricultural land in the village Mojosongo, Boyolali District, Central Java in January to May 2014. Three plants which considered as mutants has been detected. The three plants producing 95 tiller more than control and having shorter lived 26 days less than control. Further research needs to be done for nex generations M2, M3, and M5 to observe the stability of mutant due to gamma irradiation to obtain the maximum results and production of rice mutant.

Local variety, Gamma irradiation, Mentik susu

EP-01

Expression of Wnt4 gene in the Swiss Webster mice uterus as candidate antigen for wildlife immunocontraception method

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Immuoncontraception is a procedure to alter the conception in animal using immune system. The concept of immunocontraception can be delivered firstly by isolating and identifying protein or gene that significantly plays a role in one of the reproductive processes to be used as antigen. Some peptides have been developed as source of antigen, however, it does not give a satisfactory result. Wnt4 gene is a regulator of mammalian embryo implantation process could be develops as source of the antigen candidates in immunocontraception. The aim of this study is to find the expression of Wnt4 in Swiss Webster mouse uterine. Uterine were isolated from implantation site of mice at seven days gestational age, fixed in 4% paraformaldehyde, embedded in paraffin, and then sectioned at 7 μm for immunohistochemistry. The detection of Wnt4 gene expression was run by immunohistochemistry procedure using antibody anti-Wnt4 (Santa Cruz Ltd.). The result of this study shows that Wnt4 gene expression gives positive reaction to antibody anti Wnt4 almost of the uterine tissues. This study indicates that Wnt4 gene were present in the mouse uterus during implantation period of pregnancy. Overall the results of this study demonstrate that Wnt4 gene from Swiss Webster mice will be very beneficial as an antigen source in regulating fertility of wildlife.

Antigen, immunohistochemistry, Wnt4

EP-02

The influence of the media Limboto lake sediment on the growth of maize were inoculated arbuscular mycorrhizal

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Lake Limboto now be categorized as critical lake called the Sea are broad and deep decline. In 1932, the area of Lake Limboto of 7,000 hectares and a depth of 30 m, in 1962, was reduced to 4,250 ha breadth and depth of the lake is 10 m. In 2012, the area of the lake is estimated to be only 3,000 ha and depth of about 2 m. The thickness of the sediment/sludge in Lake Limboto estimated 3-5 m in the east, from 5.8 to 6.4 m along the north-west, from 8.8 to 10.2 m along the south side and 12.4 m in the middle of the lake. One effort to reduce the thickness of the sediments of Lake Limboto (Sedalim) is to dredge the sediment back into the media and use it to grow plants. However Sedalim, besides containing many nutrients carried by water runoff that comes from agricultural land, also contain toxic substances derive from household waste and small industry located around Lake Limboto. This study aims to determine the effect of arbuscular mycorrhiza on the growth of corn plants (Zea mays L.) grown on media which inoculated arbuscular mycorrhizal Sedalim. Research
EP-03

Effects of compost type and rootstock length on growth response of fruit seedlings and vegetable plants in the nursery

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Three species of fruit plant i.e. sweet star fruit (*Averrhoa carambola* L.), durian (*Durio zibethinus* Murr.) and guava (*Psidium guajava* L.) were propagated by either grafting or budding technique. The grafted plants were grown on the media containing various types of compost i.e. grass compost (K-1), spent compost of paddy straw mushroom (K-2), and spent compost of oyster mushroom (K-3) in combination with rootstock length i.e. 45-55 cm (TB-1), 65-75 cm (TB-2) and 75-90 cm (TB-3). The same compost was also used as soil amendments for growing vegetables plants i.e tomato (*Solanum lycopersicum* L.) and kangkung (*Ipomoea reptans* Poir) in the screen house. Result showed that the highest survival of grafted sweet star fruit (71.11% and 71.56%) was obtained from TB-3 media containing K-1 by grafting and budding technique respectively. The highest survival of grafted durian (68.89%) was obtained from TB-1 by grafting technique. Budding technique seems to be not appropriate for guava propagation which was indicated by 0% of survival. All types of compost applied to grafted fruit plant were not different in each growth parameters observed. Application of compost on tomato plants as fruit vegetable showed that spent compost of oyster mushroom of 3 kg resulted in the highest of fruit fresh weight, length and diameter. Meanwhile, the same volume and type of compost applied to kangkung as leaf vegetable resulted in the highest of plant height, total leaves and total biomass.

vegetative propagation, fruit plant, vegetable plant, compost, growth parameter

EP-04

Correlation of pod characteristics with pod borer *Etiella zinckenella* Treitschke preference

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Pod borer *Etiella zinckenella* is one of the major pests in soybean. Physical pod character influenced host plant preference. The aim of the researchh was to determine the correlation of pod characters with pod borer preference. As many as 16 soybean genotypes were evaluated. Intensity of pod injury, intensity of seed injury, stalks length; trichome density and trichome position were observed in this study. The result showed that low injury intensity was found on erect and oblique trichome position. Furthermore, stalk length did not correlate with injury intensity. P6, P8, and P9 were less preference to pod borer attack. Pod injury intensity was positively correlate with seed injury intensity (r=0.85).

Physical characteristic, pod borer, pod soybean

EP-05

Effect of five host plants on the growth and development of armyworm, *Spodoptera litura*

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*Spodoptera litura* is the important pest on soybean in Indonesia. The objective of this study was to determine the influence of different host plant on the growth and development of *S. litura*. This research was conducted in Laboratory of Entomology, Indonesian Legume and Tuber Crops Research Institute, Malang, East Java on March-April 2014 using randomized complete design, five treatments and 30 replicates. The treatments were *Glycine max*, *Jatropha curcas*, *Ricinus communis*, *Ipomoea aquatica*, and *Amaranthus* spp. One leaf of each host plant was entered into test tube and was infested by one larva of *S. litura* 0 days after emergence. The result showed that feeds significantly affected the body size, survival rate, reproduction, and longevity of *S. litura*. The longest and heaviest larva were found on *I. aquatica*, 28.5 mm and 0.42 g respectively. The longest, widest, and heaviest pupa were found on *I. aquatica*, 19.3 mm; 5.0 mm; 0.36 g respectively. Survival rate was highest on soybean (29 individuals), followed by *R. communis* (26 individuals). Furthermore, lifetime fecundity was high on *I. aquatica* (9 egg/female). In conclusion, *I. aquatica* and *R. communis* leaves were found to be preferred for *S. litura* life so it can be used as feed for mass rearing of *S. litura*.
Development, host plant, growth, reproductive system, Spodoptera litura

**EP-06**

Mycorrhizal population on various cropping patterns on sandy soil in dryland area of North Lombok, Indonesia

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Inoculation of arbuscular mycorrhizal fungi (AMF) on maize in sandy soil has positive effects on plant growth, due to symbiotic interactions with AMF. The study aimed to determine the population AMF and nutrient uptake on the second cropping cycle of corn-based cropping patterns which utilized indigenous mycorrhizal fungi on sandy soil in dryland area of North Lombok, West Nusa Tenggara. The experiment was conducted at the Akar-Akar Village in Bayan Sub-district of North Lombok District, in a Randomized Block Design, with 4 replications and 6 treatments of cropping cycles (P0: corn-soybean as a control, in which the corn plants were not inoculated with AMF; P1 = corn-soybean, P2 = corn-peanut, P3 = corn-upland rice, P4 = corn-sorghum, and P5 = corn-corn, in which the first cycle corn plants were inoculated with AMF). Results indicated that the mycorrhizal populations (spore number and infection percentage) were highest in the second cycle sorghum, achieving 335% and 226% respectively, which were significantly higher than those in the control. Increased uptake of N, P, K and Ca in the sorghum plants at 60 DAS of the second cropping cycle reached 200%; 550%; 120% and 400% higher than in the control. The soil used in this experiment is rough-textured (sandy loam), so it is relatively low in water holding capacity and high porosity.

Corn, cropping pattern, dryland, mycorrhizal

**EP-07**

Isolation and characterization of mannanase, xylanase and cellulase from marine bacteria Bacillus sp.

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Isolation, identification and characterization of mannanase, xylanase and cellulase producing indigenous marine bacteria have been conducted from total 20 isolates. Based on 16S rDNA sequence analysis, three potential isolates identified as Bacillus subtilis (M8), Bacillus tequilensis (X4) and Bacillus cereus (C9). The potential strains M8, X4 and C9 can produce mannanase, xylanase and cellulase activities such as 9.5 U/mL: 0.36 U/mL:0.56 U/mL with optimum pH and temperature 6.0:50°C, 5.5:70°C and 8:50°C respectively. Based on the TLC analysis, mannanase from M8 and xylanase from X4 has potential to hydrolyzed mannan and xylan for producing oligosaccharides with size around tri-hexasaccharides as a main product.

Bacillus, cellulase, hemicellulase, marine bacteria, oligosaccharide

**EP-08**

In vitro embryo development of a wild orchid Dendrobium phalaenopsis as an efficient method for ex situ conservation

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Dendrobium phalaenopsis Fitzg is an endemic orchid from Larat Island in the eastern Indonesia at Maluku region with beautiful purple butterfly-shaped flowers. The existence of this orchid is endangered in their original habitat, therefore ex situ conservation is needed. D. phalaenopsis orchid seeds are microscopic sized with no endosperm, so in vitro culture on artificial medium is the best method for seed germination. The objective of this study is to analyse the stages of embryo development of this orchid during in vitro condition and to confirm whether the addition of organic supplement such as coconut water (CW) and peptone (P) in medium can improve the quality and quantity of embryogenesis or not. The methods were performed using 2.5 months old orchid pods. Orchid seeds were sown on Vacin and Went (VW) basic medium and VW with addition of 10% of CW and 2 g/L P. The growth and development of embryos were analysed morphologically and anatomically every weeks. The result showed that there were 6 stages of embryo development from embryo to protocorm (tuber-like developing orchid embryo) up to shoot formation. Eight weeks after seed sowing, about 67.30% seed germinated on VW basic medium, but it reached 94.42% seeds germination on VW+CW+P medium. This data indicate that the addition of 10% of CW and 2 g/L of P in VW basic medium accelerate

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the growth and development of *D. phalaenopsis* orchids embryos in the in vitro condition as the best method for producing plantlets.

Coconut water, *Dendrobium phalaenopsis*, embryogenesis, peptone, Vacin and Went medium

**EP-09**

Construction of 35S::PaFT1::GFP containing Ti plasmid in *Agrobacterium tumefaciens* EHA101 for genetic transformation in plant

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Flowering in plants occurs due to the transition from vegetative phase to generative phase. Flowering locus T (FT) is one of the genes that activates flowering in *Arabidopsis*. PaFT1 gene is one of FT homologous gene isolated from *P. aphrodite*. With analogous to the model plant *Arabidopsis*, over expression of PaFT1 gene is expected can be used to accelerate flowering in plants. The objective of this study is to construct a useful Ti plasmid as a recombinant plasmid that harbour T-DNA which contains functional PaFT1 gene and GFP reporter gene that will allow easy and effective screening for transformant plants. The method was carried out by cutting the 35S::GFP fragment (350 bp in size) from pSK35S::GFP plasmid using EcoRI restriction enzyme digestion. The 35S::GFP fragments were running in 0.8% agarose gel electrophoresis, then cut of from the gel and following the gel extraction method. The resulting fragment of 35S::GFP were then examined using PCR with specific primers for GFP and HPT. The pGAS 101 plasmid that contained PaFT1 gene was opened using EcoRI restriction enzymes, then inserted with the 35S::GFP fragments, ligated it with Ligation High-DNA ligase enzymes. The results showed that the fragment of 35S::GFP from pGAS::GFP plasmid was successfully inserted into pGAS101, hereafter it terms as pGAS 101-GFP. The recombinant plasmid of pGAS101-GFP then was transferred into Escherichia coli strain DH5α. After checking the structure of pGAS::GFP plasmid, the plasmid was isolated from DH5α and transferred into A. tumefaciens strain EHA101. Fluorescence microscope analysis showed that the GFP express green fluorescence under uv light, indicating that the plasmid pGAS 101::GFP was a recombinant Ti-plasmid that contains the recombinant T-DNA with 35S::PaFT::GFP. The recombinant p35S::PaFT1::GFP/A. tumefaciens strain EHA101 is ready to be used for genetic transformation to accelerate flowering in plants.

A. tumefaciens strain EHA101, E. coli strain DH5α, flowering in plant, GFP, PaFT1

**EP-10**

**Green pod culture of variegated-Phalaenopsis "Sogo Vivien" orchid**

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*Phalaenopsis* Sogo Vivien are mini attractive orchid hybrids, which some of their plants exhibit beautiful variegated pattern of leaves. Green pod culture was done in order to know the development of germinated seed, the best medium for embryo growth, and the phenotype of progeny (F1). This study used seed as explants which were obtained from the 2.5 month old green pod orchids as the result of self pollination of variegated- *Phalaenopsis* Sogo Vivien and from backcross with the parents, *P. amabilis*. The VW, NP and MS media were used for seed plantation from selfing, while NP medium was used for seeds plantation from the backcrosses. The growth of *Phalaenopsis* Sogo Vivien embryo in NP medium showed 6 different developmental phases, and the presence of Shoot Apical Meristem (SAM) followed by the formation of increasingly dense absorbing hair (phase 6) was observed in 4 week after sowing (WAS). The use of NP medium showed the best growth and development of protocorms. The percentages of the late phase (phase 5 and 6) and the size of protocorm growing on NP medium showed larger than that in VW or MS medium. The emerged plantlet from selfing mostly had non-variegated leaves phenotype and only one (out of 6450 seeds) showed variegated leaves. All plantlets obtained from the backcross showed normal phenotype with no-variegated leaves. These phenomenon shows that variegated leaves phenotype is a very low frequency of mutation that can only be mass produced through in vitro culture using vegetative parts instead of seed (generative). Green pod culture was effectively used for quick detection of plant phenotype without having to wait too long until the fruit becomes ripe.

Green pod culture, protocorm, *Phalaenopsis* Sogo Vivien, variegated-leaves
**EP-11**

Study of cross inoculation of *Rhizobium tropici* (DCM) isolated from *Acacia mangium* in combination with other potential soil microbes on their ability to support the growth of soybean

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Rhizobia bacteria have been well known as nitrogen fixing bacteria which could promote the growth of soybean plants. The bacteria could established a symbiosis living with crops and trees legume. The successful symbiosis living is normally identified by the specific compatibilities between the bacteria and host plants. However, there is a chance that the bacteria which was isolated from trees legumes could also infect and be compatible in developing the symbiosis living with crops plant such as soybean. This study aims to confirm that *Rhizobium* bacteria isolated from tree legume, *Acacia mangium*, could successfully develop the symbiosis living with soybean. In addition, this research also study the possibility of *Rhizobium* bacteria in working with other potential soil microbes such as mycorrhizae and others potential microbes on supporting the growth of soybean. Green house experiment showed that *Rhizobium* tropici combined with other potential soil microbes can significantly support the growth of soybean. This is shown with the increase of upper plant biomass and number of pods. This research finally opens the possibility of using biodiversity of nitrogen fixing microbes to be packed as an update quality biofertilizer for soybean.

Biofertilizer, mycorrhizae, *Rhizobium tropici*

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**EP-12**

Fecundity performance of nile tilapias (*Osteochilus hasseltii*) from different districts in West Java

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A study on the reproductive aspect of nile tilapias (*Osteochilus hasseltii*) has been conducted from October 2015 to March 2016 that includes elements of body length, weight, gonad maturity level (GML), fecundity, and diameter of the eggs. Samples for the study are collected from farming activities in Districts in West Java, such as Cianjur, Tasikmalaya and Kuningan, that include 33 fish. The observed parameters are the correlation between weight and fecundity, correlation between body length and fecundity, GML and the diameter of the eggs. The method used for this research is explorative approach and the data analyzed with descriptive approach. The results from the observation show that the relation between the weight and fecundity in Cianjur District is $y= e^{0.024x}$, while the body length and fecundity is $y= e^{0.0724x}$. In Tasikmalaya District it is found that the correlation between the weight and fecundity is $y= e^{0.413x}$, while the correlation between the length of the fish and fecundity is $y= e^{0.0724x}$. In Kuningan District it’s found that the correlation between the weight and fecundity is $y= e^{0.2902x}$, while the correlation between the length of the fish and fecundity is $y= e^{0.6859x}$. The dominant gonad maturity level of Nile tilapias in Cianjur is GML 4 (50%), Tasikmalaya is GML 6 (100%), and Kuningan is GML 5 (55,56%).

Eggs diameter, fecundity, *Osteochilus hasseltii*, West Java