Surabaya Strategy to Answer Air Pollutant Improvement

I A Pratiwi¹, R P Ayu²

¹Biology Department, Airlangga University, Indonesia
²Dinas Lingkungan Hidup Provinsi Jawa Timur, Indonesia
E-mail: intan.ayu.pratiwi@fst.unair.ac.id

Surabaya as metropolitan city and 2nd biggest city in Indonesia has a challenge especially in air pollutant. Increasing population, mass transportation, industry and regional economic give bad result in air pollutant. Increasing population from 2014 to 2017 goes up until 7.75%. Increasing the population can also increase the level of air pollution. Problems in this research is to present of result and analysis of Kota Surabaya in management of green open space to achieve air pollutant control. Focus of this research not only on biology and environment reviewed aspect but also interface with present main economic, population and climate in Surabaya. This research was conducted using qualitative research methods from observation and official documents of related instance. This research concludes that green open space management with data comparison 2014 and 2017 that are managed by Dinas Kebersihan dan Pertamanan (Park and Sanitary Office) Kota Surabaya has good strategy in plant selection to increase the quality of air. Although area of green open space had minor reduction and increase population as well as economic sector. In 2017, Surabaya can archive 90.26 value of air pollution index or increase 6.83% from 2014. This condition present the quality of green open space can be reached beyond plant selection.

Keywords: Surabaya, Air, Pollutant, Index, Green
Microplastics Types and Its Abundance Distribution in Kali Surabaya in Wonokromo, Dukuh Pakis, Wiyung, Karangpilang, and Lakarsantri

N Citrasari1, D R M Isnadina1, L S Octavia1 and H M Faruqi1

1Environmental Engineering, Department of Biology, Faculty of Science and Technology, Universitas Airlangga, Surabaya, Indonesia
E-mail: nita-c@fst.unair.ac.id

This research aimed is to determine types, to quantify the abundance, and to know microplastics distribution in Wonokromo, Dukuh Pakis, Wiyung, Karangpilang, and Lakarsantri District segment. The samples were taken using plankton net in 12 km which were divided into four sampling areas. The samples were filtered using 5 mesh, 40 mesh, and 200 mesh multilevel filters. Then extracted using Catalytic Wet Peroxidation Oxidation (CWPO), 0.05 M FeSO4 dan H2O2 30% to degrade the organic matters. Microplastics identification and types separation was carried out with optical microscopy method using Olympus SZ2-ILST stereo microscope, Dino-Eye (Microscope Eye-Piece Camera), and DinoCapture 2.0 software with a 40x magnification. Microplastics density were measured by density gradient solutions, combination of ethanol 96%, aquadest, and ZnCl2 which have 0.8-1.8 g/cm3 density range. The results showed that microplastics were found in Kali Surabaya in fragments, films, pellets, granules, filaments, and foams types. The abundance of each types, namely fragments 20.345.556 particles/km2, films 1.024.444 particles/km2, pellets 64.444 particles/km2, granules 1.492.222 particles/km2, filaments 408.889 particles/km2, and foams 5.371.111 particles/km2 which were distributed in four sampling areas. The density of each microplastics types, namely fragments 0.8-1.0 g/cm3, films 0.8-0.9 g/cm3, pellets 0.8-0.9 g/cm3, and foams <0.8 g/cm3.

Keywords: Abundance, Density, Distribution, Kali Surabaya, Microplastics
In Vivo Immunomodulatory Activity Of Faloak Bark Extract (Sterculia quadrifida R.Br)

Aji Winanta¹, Triana Hertiani²*, Purwantiningsih³, Siswadi⁴

¹Pharmaceutical Biology Department, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Bantul, Yogyakarta, Indonesia
²Pharmaceutical Biology Department, Faculty of Pharmacy, Universitas Gadjah Mada, Sekip Utara, Yogyakarta, Indonesia
³Pharmacology and Clinical Pharmacy Department, Faculty of Pharmacy, Universitas Gadjah Mada, Sekip Utara, Yogyakarta, Indonesia
⁴House of Research Environment and Forestry, Kupang, Jl. Alfons Nisnoni No 7B, Airnona, Kupang, Indonesia
E-mail : a.winanta@gmail.com

ABSTRACT

Background: Faloak (Sterculia quadrifida R.Br.) is widely used as traditional medicine in Indonesia to improve stamina (reduce tiredness for heavy workers). However, no scientific reports so far on the immunomodulatory effect. Objective: Determine the effect of the bark of faloak as immunomodulatory agents by evaluating their effect on BALB/c mice lymphocytes proliferation, the activity of macrophage, nitric oxide production, and the immunoglobulin G titer by in vivo techniques.

Materials and Methods: Decoction of the faloak bark was used for the in vivo assay. BALB/c mice were divided into five dose groups, each consisting of 5 mice. One group was chosen as the base-line, three groups were used for the group treated with the test substance at doses of 7,5; 11,75 and 17,5 g/Kg of body weight of mice (p.o), and a positive control group was treated with Phyllanthus niruri Linn. (PN) extract (Stimuno®) 0,585 g / Kg BW (p.o). The test samples were given every day. All mice were induced by hepatitis B vaccine at day 7 and 14. The activity of in vivo assay was determined at day 19. The activity of immunomodulatory effec is expressed in phagocytic capacity, phagocytosis index, nitric oxide, OD of lymphocyte proliferation and IgG titers.

Results: The macrophage phagocytic capacity and phagocytosis index were significant increased (p<0.05), nitric oxide production were altered significantly (p<0.05), but OD of lymphocyte proliferation and production of IgG titers were unchanged (p>0.05).

Conclusion: This study showed that the Faloak bark could increase the macrophages phagocytic activity, but no effect on lymphocyte cells and therefore did not influence the adaptive immune response.

Keywords: Faloak bark, immunomodulatory, in vivo study
Optimization of Gold Nanoparticles (AuNPs) as Platform to Immobilization with Probe Molecular Beacon (MB) for DNA Detection Applications with Colorimetric Method

Hari Widada,1,2) Mar’atus Sholikhah1)
1) Fakultas Kedokteran dan Ilmu Kesehatan Universitas Muhammadiyah Yogyakarta
2) Program Studi S3, Fakultas Farmasi, Universitas Gadjah Mada, Yogyakarta
E-mail: hr.widada@gmail.com

ABSTRACT
Abstract. Gold nanoparticles are platforms that can be immobilized with probe, so they can be used as biosensors. In health sector, biosensors are used for biomedical applications, such as for DNA marking and cell isolation. In addition, it can be used as a method for Halal Authentication applications for meat products. This study aims to determine the optimum conditions for the synthesis of gold nanoparticles as platform for immobilization and application of AuNPs-MB as biosensors with the colorimetry method for Halal Authentication applications for meat product. This research was optimize gold nanoparticles using 6 series of HAuCl₄ concentration, there are 0.0635; 0.127; 0.19; 0.254; 0.635; dan 1.27 (mM). The most optimum concentration, then immobilized with probe MB and measured using Uv-Vis Spectrophotometer to see the absorption and using Scanning Electron Microscope (SEM) to see the size and distribution of nanoparticles. The results showed that 0.19 mM of AuNPs, gave the best results, which was stable for 3.5 months, has good results by measured using SEM with an average size of 21.7 nm. The value absorbance before to after immobilization was decreased, from 0.226 to 0.167 and indicate that the process is success. The conclusion of this study is AuNPs-MB is proven to be a biosensor for Halal Authentication applications using colorimetric method.

Keywords: Gold Nanoparticles, Molecular Beacon, Biosensor, Immobilization, Colorimetry
Cytotoxic Effect of Bandotan (Ageratum conyzoides L.) Chloroform Fraction and 5-Fluorouracil as Co-Chemotherapeutic Agent on HeLa Cervical Cancer Cell Line by In Vitro and In Silico Assay

Rifki Febriansah*, Titi Komalasari

School of Pharmacy, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Indonesia
*corresponding author, e-mail : briansyah_rifki@yahoo.com

ABSTRACT

Cervical cancer is the biggest Indonesian female cancer with 91,692 cases in 2013. On the other side, cancer therapy induced many side effects for patient during the treatment. Further, its need to increase cancer drug efficacy or minimize side effect by developed as co-chemotherapy agent from nature. One of them is bandotan (Ageratum conyzoides L) that containing flavonoid group such as nobiletin is estimated could inhibit cancer cell proliferation and viability. The aim of this study is to determine co-chemotherapy activity of chloroform fraction of Ageratum conyzoides L. (CF) and its combination with 5-Fluorouracil (CF-FU) based in vitro and in silico assay. Ethanolic extract of bandotan were fractionated with chloroform. Thin Layer Chromatography (TLC) used to identified active compound qualitatively and in vitro study with MTT Assay method to find out the viability of HeLa cell line after treatment. Molecular docking with Autodock Vina for in silico study to visualized molecular interaction and affinity between nobiletin and 5-fluorouracil with Bcl-XL (an anti-apoptotic protein receptor). The result of TLC for CF had Rf value 0,75, it has the similar value with quersetin standard and indicated that CF contained flavonoid compound. The molecular docking had ΔG for nobiletin and 5-FU are -8,0 and -4,7 kcal/mol, respectively. This result showed that affinity and interaction of nobiletin with Bcl-XL protein higher than 5-FU. From single cytotoxic assay the IC50 value of chloroform fraction of bandotan was 30 µg/ml and 5-FU was 45 µg/ml. From combination assay of CF and 5-FU showed CI value was 0.36, it means it had synergistic effects. Based on the result, CF have good effect to inhibit HeLa cancer cell line and potential to develop as co-chemotherapy agent with 5-FU.

Keywords : Ageratum conyzoides L., nobiletin, Bcl-XL protein, molecular docking, cytotoxic assay
Piperine of Piper nigrum Linn. Antagonized Acetylcholine uscarinic 3 Receptor: In vitro and In silico Study on Isolated Cavia porcellus Trachea.

P N Arsito¹, I Perdana¹

¹School of Pharmacy, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia
E-mail: puguh.arsito@gmail.com

Piperine is an alkaloid compound which can be found in black pepper (Piper nigrum Linn.). Previous studies and empiric use reported that piperine has pharmacological effect on bronchospasm medication. Apart from Histamine 1 receptor (H₁), acetyl choline muscarinic 3 receptor (AchM₃) also involved in the mechanism of bronchoconstriction. The aim of this study was to determine antagonism property of piperine on the isolated cavia porcellus trachea. The method used was in vitro (isolated organ bath) and in silico (molecular docking). During in vitro study the contraction of trachea was induced by Acetyl-β-Methylcholine in a serial concentration. In the in vitro study, piperine at the concentration of 10 µM could shift contraction curve to the right, as the result of bronchodilatation effect. Furthermore, the contraction can not return normally to the 100% of E max. In the reversibility study, the trachea was rinsed every 30 minutes and the E max of contraction still stood at 68,49% (the characteristic of noncompetitive). pD 2 score of control group was 5,50, while piperine 10 µM group was 4,67. This pD 2 shift was statistically different. From the in silico test (Autodock), piperine shown the antagonism activity in the AchM₃ receptor which the docking score stood at -115, while native ligand (tiotropium) score is -120. Based on this result, we conclude that piperine has noncompetitive antagonist on AchM₃ receptor. Abstract.

Keywords: Piperine, Antagonized, in vitro, in silico, AchM₃
Determination Of ED50 AEW1 As Anti-Inflammatory In Rats Induced Caragenin

Wita Nanda Putri¹, Andy Eko Wibowo¹

¹Fakultas Kedokteran dan Ilmu Kesehatan Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia
apotekerandy@gmail.com

AEW1 is a derived synthetic compound. This compound is the synthesis product of pyridin-2-carbaldehyde and 2,5-dihydroxyacetophenone without solvent with K₂CO₃ catalyst using microwave method. AEW1 has anti-inflammatory activity with percentage of Anti-Inflammatory 50.05 ± 16.244% not much different from Ibuprofen antiinflammatory drugs. This study was conducted to determine the dose of effectiveness ED₅₀ of this compound.

This study used induced paw edema method, which measured edema at rat foot with. The test used animals were Wistar rats. A total of 25 rats, divided into 5 groups. Group I: negative control (CMC- Na 0.5%). Group II: compound comparing diclofenac sodium dose 13.5 mg / KgBB. Group III, IV, V: AEW1 at doses of 50; 100 and 200mg / KgBB. The result of edema volume measurement was calculated value of Area Under Curve (AUC) and % anti inflammatory, then data were analyzed to know the difference between groups. In the treatment group, anti-inflammatory and logarithmic doses made a linear regression curve to determine the ED₅₀ value.

The result of this research get linear equation y = 29x - 19.20 with value of R² or linearity is 0.997. From the linear regression equation of compound AEW1 an ED₅₀ value of 243.33mg / KgBB.

Keywords: AEW1, induced paw edema method, Antiinflammatory, ED50.
Correlation Of Timbal (Pb) Towards The Number Of Stomates On The Plant Dracaena Marginata Tricolor In Several Places Of Surabaya City

D P Farli¹, H Purnobasuki¹, and Hamidah¹

¹Prodi S-1 Biologi, Departemen Biologi, Fakultas Sains dan Teknologi, Universitas Airlangga Surabaya
Email : hamidah@fst.unair.ac.id

Abstract. This research is an observational study that aims to determine the characteristics of stomata in the leaves of Dracaena marginata tricolor. This is based that many Dracaena marginata tricolor plants are planted on the roadside as road shade plants and as ornamental plants in parks of Surabaya City. This research is descriptive analysis. Sampling was carried out at three locations which had different levels of motor vehicle density, namely at the location of the Bundaran Dolog which has a high density of motorized vehicles, Gading Ketabang street which has a medium density of motorized vehicles and location of Kebun Bibit 2 which has a low density of motorized vehicles. The results showed that each location had a different amount of stomata. This difference in results is caused by the effect of vehicle emissions in each location. The higher amount of stomata, the more polluted air quality, while the lower amount of stomata, the better the air quality. The calculation of the average Pb lead level in the Dracaena marginata tricolor leaf from the highest was obtained at the Bundaran Dolog Surabaya 2.01 µg / g. Calculation of the average Pb lead level in the at the Dracaena marginata tricolor leaf location of Jl. Jalan Gading Ketabang was obtained at 1.06 µg / g and at Kebun Bibit 2 Surabaya obtained an average Pb lead level in the leaves of Dracaena marginata tricolor of 0.82 µg / g. The highest calculation of the number of leaf stomata is at the Bundaran Dolog Surabaya location of 21. At the location of Jl. Gading Ketabang obtained an average number of stomata of 18 and at the location Kebun Bibit 2 Surabaya the results of the calculation of the average number of stomata were 16.

Keywords: Dracaena marginata tricolor, Pb lead, stomata
Potential Local Food Use Insect as a Source of Protein in The Future

Suryadi Pappa

Study Program of Veterinry Medicine, Medicine Faculty, Hasanuddin University, Makassar, Indonesia
E-mail: suryadipappa21@gmail.com

Global warming and food security are two important objects that have received attention in recent years. The issue of methane gas (CH4) and nitrous oxide (N2O) caused by the livestock sector is still being debated until now. In addition, the increasing population makes the demand for food of animal origin increases. This is not comparable to agricultural land that is increasingly narrow due to industrial land and residential areas. Other sources considered be rich in protein are algae, mycoproteins, cultured meat, vegetable protein, and insects but insects considered to resemble meat because of its high nutrient content. Sociocultural problems make food from insects difficult for people to accept. Making local food made from insects be a solution to overcome this problem. Some types of insects that be used as sources of animal protein are grasshoppers, crickets, caterpillars, bees, ants and beetles. Local food made from insects be a solution for global warming and food security in the future.

Keywords: Global warming, Insect, Local food, Protein, Security food.
Utilization of Fly Ash and Bottom Ash from Coal Fired Power Plant by Involving Community

Mekkadinah¹, Suyud Suwarno¹, Iwa Garniwa², and Haruki Agustina¹

¹ Environmental Science School, Indonesia University, Jakarta, Indonesia
² Electrical Engineering Department, Indonesia University, Jakarta, Indonesia
E-mail: mekkadinah@gmail.com

Abstract.
The development of power generation capacity in Indonesia is directed to meet the load growth and planned addition to build coal-fired power plants (CFPP) will dominate the type of power plant, reaching 31.9 GW or 53.0% in the year 2017 to 2026, and by 2019 the addition of very high-power plants reaches 18.7GW. Coal demand continues to increase every year, until the year 2026 reached 152.8 million tons per year. The CFPP operation produce solid waste as Fly Ash and Bottom Ash (FABA) or generally named by Coal Combustion Products (CCPs). Formation of the CCPs in general is 3-5% of total coal used, then will required wide land for the placement of FABA product if it cannot be utilized. Characteristics of the CCPs could substitute cement for infrastructure. The utilization of the CCPs in Indonesia only 0.47% of total waste. In the other side there is problem 5.61% unemployment people in Indonesia. Lessons from the ‘sound material cycle society’ policy of Japan, recycling is not only about technical solutions or engineering of resource-recovery from waste. Rather, it is an issue of how to systematically organize institutional infrastructure and physical infrastructure to sustain recycling mechanisms. This article purpose to analyze opportunity how the CCPs could be utilized by involve community around the CFPP as sound material cycle society.

Keywords: Fly ash, Bottom Ash, material cycle, community.
Spatial Dynamics of Agricultural Land in Banyuasin Regency, South Sumatera: Its Opportunities and Threats.

Intan Pujawati, Munawaroh, Ellen Suryanegara, Aninda W. Rudiastuti

Geospatial Information Agency (BIG), Bogor, Indonesia
E-mail: intan.pujawati@yahoo.co.id

The availability of agricultural land, especially paddy fields, is an inseparable part in efforts to maintain national food security. Changes in land cover/land use can occur due to several factors including social, political, economic, cultural, natural, and technological. Geographic Information Systems (GIS) operate as a tool to comprehend the changes related to the driver's factors. Along with the rapid development of the region, the need for agricultural land is one important aspect to consider. The purpose of this study was to examine the spatial dynamics of paddy land cover in Banyuasin Regency for more than 2 decades using the Markov Chain approach and to analyze the inhibiting and supporting factors in developing paddy farming in the region. The inhibiting factor discussed in this study is the potentiality of floods on agricultural land, especially paddy fields. The results showed that paddy fields in Banyuasin District experienced the widest decrease of 2,863.80 ha and encountered the largest increase of 14,463.45 ha in the period 1990-2003. Changes in the area of agricultural land were also influenced by the threat factor in the form of inundation. The flood inundation crisis peaked in 2010 where 13,965.98 hectares of agricultural land was flooded. It was positively correlated with the La Nina phenomenon that has an impact on high rainfall based on Southern Oscillation Index data. However, the potential for developing lowland rice farming in swamps in Banyuasin Regency is considerably beneficial. This could be assessed from the wide market potential and can increase national rice production. Based on the farm business analysis, rice production is profitable and feasible. This can be examined from the value of Revenue-Cost Ratio (R/C Ratio) averaging 3.65 and Benefit-Cost Ratio (B/C Ratio) of 2.65 with an average production of 5-7 tons/ha/ season.

Keywords: Spatial Dynamic, Agricultural, Swamp, GIS, Markov Chain, R/C Ratio
Prevalence And Intensity Dactylogyrus sp. And Gyrodactylus sp. On Nile Tilapia (Oreochromis niloticus) In Badung River, Bali Province For Biomonitoring Of Health Ecosystem

Alfi Hermawati Waskita Sari
Department of Aquatic Resource Management, Faculty of Marine Science and Fisheries, Udayana University, Bali, Indonesia
*Corresponding author: alfihermawati@unud.ac.id

Abstract
Badung river located in the Denpasar City, which is one of the biggest river characterized near industrial and anthropogenic activities. Parasites can also play a role as a bioindicator that can show environmental changes due to aquatic environmental stressors (Marcogliese, 2005). This study was conducted in April 2017. This research to observe the prevalence and intensity level of ectoparasite Dactylogyrus sp. dan Gyrodactylus sp. and in the Nile Tilapia fish. The research method was carried out with the descriptive method. Twenty five fishes were taken randomly from the Badung river. The parasite of the fishes was observed at the Fisheries Laboratory, Udayana University. The result showed that there were 25 fishes were infected by Dactylogyrus sp. and 5 fishes were infected Gyrodactylus sp. Total number of Dactylogyrus sp. found was 91 individual from the infected fish. Total number of Gyrodactylus sp. found was 10 individual from the infected fish. The prevalence and intensity of Dactyogyrus sp. were 100% and 3.64 individual/fish. The prevalence and intensity of Gyrodactylus sp. were 20 % and 2 individual/fish.

Keywords: Nile Tilapia, Badung river, Prevalence, Intensity, Dactylogyrus sp., Gyrodactylus sp.
Application Level of Farmers in Adoption-Innovation of Environmentally Friendly Rice Field in Pesawaran District, Lampung Province

I Listiana¹, R T Prayitno¹, A Hudoyo², I Nurmayasari², and H Yanfika¹

¹Study Program of Agricultural Extension, Faculty of Agriculture, University of Lampung, Bandar Lampung 35145, Indonesia
²Department of Agribusiness, Faculty of Agriculture, University of Lampung, Bandar Lampung 35145, Indonesia

E-mail: indahlistiana1@gmail.com

Abstract. The condition of agricultural land is increasingly critical to encourage the parties to find the most appropriate strategy in agricultural cultivation. One of the strategies being pursued is through the innovation of environmentally friendly rice, as is the case being implemented in Pesawaran Regency, Lampung Province. However, the program has not been able to be implemented optimally, so that rice production in Lampung is still far from optimal production and is not yet environmentally friendly. Farmers as the main actors must be able to implement environmentally friendly lowland rice innovations. Before farmers can implement these innovations, farmers must understand how to increase empowerment in farming paddy fields to encourage increased income and sustainable regional economic growth. The introduction of environmentally friendly lowland rice innovations to the farming community has been done for years, however it has not yet yielded significant results. That is, the process of adoption and diffusion (dissemination) of the innovations that were introduced took place slowly, even some farmers stopped adopting them. These constraints need to be known including the factors causing it. Therefore this research aims to: (1) Analyze the level of adoption of innovations of environmentally friendly lowland rice farmers in Pesawaran Regency; (2) Analyzing factors related to the level of innovation adoption of environmentally friendly lowland rice farmers. The research method is in the form of a survey to obtain quantitative data. Qualitative data were collected through interviews with a number of respondents. The data collected will then be analyzed descriptively and using regression analysis. The results showed that the majority of farmers in the Pesawaran district were still low in implementing environmentally friendly lowland rice innovations. Factors that influence the adoption of innovations in lowland rice by farmers in Pesawaran District are the support of agricultural institutions, individual characteristics (age, land area, income) and information technology facilities.

Keywords: adoption, farmers, innovation, rice field, and sustainable,