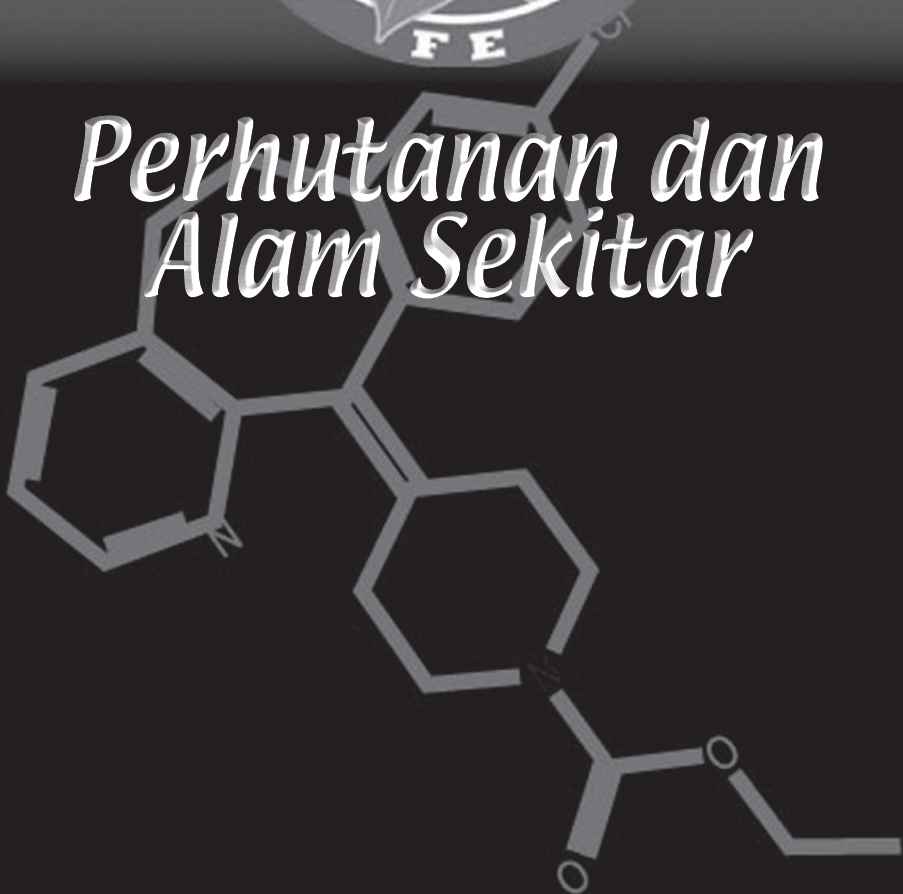




Perhutanan dan Alam Sekitar



Plant Diversity and Conservation of Ayer Hitam Forest, Selangor

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ABSTRACT

The Ayer Hitam Forest, a logged-over lowland mixed-dipterocarp forest in the State of Selangor covers an area of 1217 hectares. It is the only remaining largest tract of lowland forest left in the Klang Valley. This forest was leased to Universiti Putra Malaysia (UPM) in 1996 for 80 years for the purpose of education, research and extension. Since then various efforts have been taken to know the biodiversity it houses. A database on the plants of Ayer Hitam Forest was started in 1998. Many plots have been established and plant collections were made to achieve this and still progressing. A total of 600 species of seed plants in 220 genera and 80 families occur here. 50 species of ferns and fern-allies, 130 timber species, 40 fruit tree species and 120 species with medicinal values were recorded from this forest. Of these taxa, 20 species which are endemic to Peninsular Malaysia are also found here besides 30 new records for the state of Selangor. Although Ayer Hitam Forest is still regenerating at the late seral stage, it is nevertheless a rich fragmented ecosystem that needs to be conserved for generations to come. For tree taxa alone, this forest contains nearly three-quarter the total number of tree families, about half and one-seventh the total number of genera and species found in Peninsular Malaysia, respectively. Diversity per hectare at Ayer Hitam Forest for trees greater than 5cm at breast height is high with an average of 212 species per ha. The species found here fall into eleven commodity groups.

Keywords: plant diversity, conservation, Ayer Hitam Forest



Injection Moulded Door Frame Made from Wood Plastic Composites

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ABSTRACT

Wood plastic composite (WPC) is made of wood fine or flour compounded with plastic at different wood to plastic ratio. WPC is still a very new material relative to the long history of natural lumber as a building material but can be substituted in most instances. Currently, wood plastic composite is extruded to a doughlike consistency and then extruded to the desired shape. However, this extrusion profile has some constraint in design for products that require cross profile and different shape such as curve and bent. Therefore, injection moulded method was used to produce door frame in this study. A major advantage of injection moulded over extrusion is the ability of the material to be molded to meet almost any desired spatial conditions. It can also be bent and fixed to form strong arching curves. This study focus on using the injection moulded method to produce door frame. At the same time, the effect of coupling agents percentage and wood to plastic ratio on WPC were also evaluated to select the best formulation to produce door frame using two different commercial available coupling agents. In this study, commercial polypropylene wood fine and coupling agents premixed in dumper mixer for 30 minutes prior to extrusion process at temperature of 190 C using 110 mm counter-rotating twin-screw extruder. The WPC boards with size of 150 mm x 150 mm x 3 mm were then injection moulded by 40-ton press moulding machine. From the result, WPC produced from coupling agents Exxelor PO 1020 at 4% significantly performed better in bending properties. Further study on the effect of Exxelor PO 1020 percentage and the wood to plastic ratio showed that, WPC with 65% wood fine performed significantly better in MOR and MOE than other type of WPCs. WPC with 60% wood fine had significantly lower thickness swelling and water absorption compared to those 65% and 70% wood fine WPC. Conclusively, WPC with 65% wood fine is optimum content for WPC to produce from injection moulded method. Higher coupling agent percentage used in WPC formulation gave higher bending properties. Therefore, door frame was produce using WPC with 65% wood fine and 4% Exxelor coupling agents.

Keywords: wood plastic composite, coupling agents, bending, physical, properties

Short Run and Long Run Analysis of Domestic West Malaysian Log Market

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ABSTRACT

The global demand for timber products will continue to grow in line with increasing population and economic development especially in many developing countries. Simultaneously, forest ecosystem plays important roles in the environmental services such as carbon sequestration, recreational, water catchments, wildlife reserve and soil protection. Therefore, Malaysia is committed in implementing Sustainable Forest Management (SFM). The forest are harvested in a sustainable manner by adopting the method of reduce impact logging practices. This resulted to diminishing supply of logs to downstream timber industry. The West Malaysian log supply is in deficit since 1995. This has significant impact on major timber products. They have moved from resources surplus to one of deficit in Malaysia. Therefore, it is interesting to know the behaviour of West Malaysian log market with the implementation of SFM policy. The results indicate that full adoption of SFM could lead to substantial reduction of supply. Furthermore, a sustained price increase in the long run does not seem to have significant impact on the demand side. In conclusion, the ongoing adaptation of West Malaysian forestry to the standards of the SFM certification programs could have substantial effects only on the log supply. This will probably influence the scheme of forest plantation establishment in sustaining the West Malaysian forest sector.

Keywords: sustainable forest management (SFM), supply and demand of logs, autoregressive distribution lag (ARDL)



Distribution and Sources of Polycyclic Aromatic Hydrocarbons (PAHs) in Core Sediment Samples Collected in South China Sea

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ABSTRACT

The South China Sea is the largest sea. It is rich in natural resources like oil and natural gases. It is also has a strategic location where is a busy traffic for many ships. Sediment is a great tool for the investigation of trace contaminants such as PAHs in aquatic systems due to their huge affinity for particulate and organic matter, and their relatively long persistence in the environment. 30 core sediment samples were collected from South China Sea using Ekman Dredge. Those samples were extracted and fractionated before we analyzed them for polycyclic aromatic hydrocarbon (PAHs) by using Gas chromatography-mass spectrometry (GC-MS). PAHs are the most important persistent organic pollutant. They are introduced to aquatic environments through accidental oil spills, discharge from routine tanker operations. In other case, land based pollutant are contributed by rainfall and runoff waters. The possibilities to found the concentrations PAHs in core sediment samples are highest compared to other matrixes because PAHs are lipophilic and hydrophobic. PAHs are tends to particulate into sediment rather than water or air. Environmental forensic technique, molecular ratio is used to determine the link between pollutant and anthropogenic sources; petrogenic and pyrogenic. Molecular ratio consists of several types, generally Low Molecular Weight over High Molecular Weight (LMW/HMW) and methyl alkylated to parent. If the ratio of LMW/HMW is more than one indicates pyrogenic sources while ratio less than one shows petrogenic sources. The total PAHs concentration of the marine sediments range from 79.74 ng/g to 1481.09 ng/g dry weights. The concentration level of PAHs in the South China Sea is indicated as low to moderate contamination in relation to the global PAHs sedimentation records. These studies should be conducted from time to time to monitor the PAHs contamination in the marine environment.

Keywords: polycyclic aromatic hydrocarbons, South China Sea, persistent, molecular ratio

Sustainable Forest Management and West Malaysian Sawntimber Supply Analysis

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ABSTRACT

This paper examines the dynamic effects of sustainable forest management (SFM) on the West Malaysian sawntimber supply. Both short run and long run effects on sawntimber supply are studied using a multivariate cointegration analysis. The proxy of SFM variable is permanent forest reserve. It is expected as an exogenous negative shock in the sawntimber supply. In general, given the fact that West Malaysian sawntimber supply is decreasing since 1990s, the results show that sawntimber supply is statistically influenced by SFM practices. Furthermore, reducing of harvested area of forest has significant effect on sawntimber supply decreases. While in the short run, the results suggest that there are negative impacts of SFM practices on sawntimber supply at 10 percent significant level, in the long run, the result is significant at 1 percent level. This may to some extent pull down the West Malaysian sawntimber supply together by bringing the forest harvests to sustainable level.

Keywords: sustainable forest management, sawntimber supply, cointegration analysis



Photodegradation of Polycyclic Aromatic Hydrocarbon Pyrene by Iron Oxide in Solid Phase

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ABSTRACT

Polycyclic aromatic hydrocarbons (PAH) are pollutants produced via natural and anthropogenic sources, generated during the incomplete combustion of solid and liquid fuels or derived from industrial activities. They are ubiquitous pollutants that occur in the nature and are harmful to living organisms in the environment and human being due to their high degree of mutagenicity and carcinogenicity. To better understand the photodegradation of PAH in solid phase in natural environment, this study examined the influencing factors, kinetics and intermediate compound of PAH pyrene photodegradation by iron oxides. The results showed that among the various iron oxides tested, the degradation rate followed the order of goethite ($\alpha\text{-FeOOH}$) > hematite ($\alpha\text{-Fe}_2\text{O}_3$) > lepidocrocite ($\gamma\text{-Fe}_2\text{O}_3$) > maghemite ($\gamma\text{-FeOOH}$) under the same reaction conditions. Lower dosage of $\alpha\text{-FeOOH}$ and higher light intensity increased the photodegradation rate of pyrene. Iron oxides and oxalic acid can set up a photo-Fenton-like system without additional H_2O_2 in solid phase to enhance the photodegradation of pyrene under UV irradiation. All reaction followed first-order reaction kinetics. The half life ($t_{1/2}$) of pyrene in the system showed higher efficiencies of using iron oxide as photocatalyst to degrade pyrene. Intermediate compound pyreno was found in the photodegradation reactions using gas chromatography-mass spectrometry (GC-MS). The intermediate compound was different from those reported for photodegradation efficiency for PAHs in this photo-Fenton like system was also confirmed by using the contaminated soil samples. This study, therefore, provides useful information to develop efficient and low cost photochemical remediation techniques for PAH contaminated soils under natural conditions since goethite, oxalate and light exist in natural environment.

Keywords: photodegradation, PAH, pyrene, iron oxide, solid phase

Revealing Padawan Rich Orchid Flora and What's Next?

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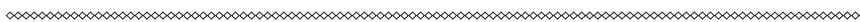
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ABSTRACT

Padawan district is covered mostly by limestone hills and outcrops known as Padawan Formation. This limestone area is considered wet with the average annual rainfall of 4069.5 mm, humidity of 85.4% and mean 24 hours temperature of 26.2° C. The climatic features above combined with the well drained thin layer of humus covering the rock surfaces provides the unique and favourable condition for orchid's growth that contributes to its high diversity in this area. Our study for the past 10 years covers all the known limestone hills in Padawan, through random sampling along existing and newly made jungle trails. To date, a total of 285 species in 68 genera of orchids have been identified with 127 species are new to Padawan, 16 species new to Sarawak, 16 species are endemic to Padawan, 3 species are critically endangered in the wild and probably 2 species might be new to science which requires further investigation and confirmation. Due to the nature of sampling technique, the studied area merely covered about 20% of the total land area of Padawan which entice us to wonder further on how many more orchid species could there be if only we could study all the accessible area. Therefore our future work in Padawan are to include a systematic plot setting to determine diversity index, DNA barcoding for rare, endangered and endemic species, to access their population size and to propose mass propagation so that pressure on the wild population could be reduced. These future works are aimed to evaluate the conservation status of these orchids which could be utilized to ascertain their future existence either *in situ* or *ex situ* depending on which is more valuable to the authorities concerned, the limestone quarrying or the unique flora and fauna diversity in Padawan limestone area.

Keywords: Padawan, orchids, diversity, future and conservation



Distribution of Linear Alkylbenzenes (LABs) in Selected Sediments of Kuching and Kota Kinabalu Rivers

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ABSTRACT

A study was carried out at some selected coastal areas of Kuching river in Sarawak to determine the concentration of linear alkyl benzenes (LABs) in coastal sediments. LABs have been used as a molecular marker to detect sewage pollution in aquatic environment. Nine surface sediment samples and 5 samples (Bitumen, street dust, tire rubber, fresh crankcase oil, and used crankcase oil) were chosen for each point was analyzed. Also 1 still have number of samples from Kota Kinabalu River. The determination of types and concentration of Linear alkylbenzenes were analyzed using Gas Chromatography-Mass Spectrometry (GC-MS). Linear alkylbenzenes (LABs), which have been proposed as markers of the hydrocarbon component of domestic and industrial wastes measured in sediment surface from Kuching river in Sarawak. This is to determine the concentration and compound in the samples. To quantitatively express the isomer composition, a ratio of internal to external isomers (I/E ratio) has been proposed as an index of the degree of LAB degradation.

Keywords: linear alkylbenzenes, sediments, Kuching and Kota Kinabalu rivers

Mangrove Sediments: The Source or Sink of Polycyclic Aromatic Hydrocarbons (PAHs) Contamination?

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ABSTRACT

Mangrove ecosystems in Malaysia especially along the coastline that facing the Straits of Malacca such as Rembau-Lingga estuary are exposed to anthropogenic contamination of polycyclic aromatic hydrocarbons (PAHs) from tidal water, river water and land-based sources due to the increasing of industrialisation and urbanisation. Moreover, anthropogenic activities in marine environment such as oil spill and leakage from boats and ships might harm and affect the mangrove ecosystems due to transportation of particulate matters that partition with the PAHs to the mangrove sediments which has unique features such as rich organic carbon and anoxic conditions. The results of the study will show the distribution and sources of PAHs in mangrove sediments thus explain the changes in PAHs mangrove surface sediments with time. In addition these will demonstrate the effect of PAHs on mangrove plant as PAHs being uptake from sediments to the mangrove plant through pneumatophore root, since used lubricating oil (petrogenic source of PAHs) could destroy conducting tissues, especially those in fine roots. These are important as it will ultimately help to quantify the current concentration of this compound in Malaysian mangrove ecosystems since mangrove have been given more attention after the tsunami tragedy.

Keywords: PAHs, mangrove, sediments, pneumatophore root, organic carbon



Effects of Fertiliser on Growth and Physiology of *Hibiscus cannabinus* L. (Kenaf) Planted in Bris Soil

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ABSTRACT

Kenaf (*Hibiscus cannabinus* L.) is one of the most potential annual crops planted throughout the world. It is a highly productive, warm-seasonal C3 annual crop, fast growing and multipurpose. It has been utilized as a substitute of jute as well as for the production of pulp and paper. With strong and long fibre yield, mass production of Kenaf throughout Malaysia is critical. The utilisation of less fertile soils such as BRIS soils is important to increase the Kenaf production throughout Malaysia. Thus, the objective of this study was to examine the effects of different fertilizer applications on photochemical efficiency, growth and gas exchange parameters of Kenaf planted in BRIS soil in the dry and wet seasons. V36 variety was used and planted in three different plots treated with different rates of fertilizer namely high (1960 kg/ plot), medium (1260 kg/ plot) and low (700 kg/ plot) where each plot comprised 106,000 trees. The antagonistic effects of different rates of fertilizer application were found for photochemical efficiency (F_v/F_m) where higher application of fertilizer level resulted in lower value of F_v/F_m . However, contrasting results were found for growth and gas exchange parameters. Significant effects of fertilizer were observed for diameter, height, leaf number and area as well as biomass during wet season. The correlation analyses between diameter, height and total aboveground biomass were more pronounced in the wet season. The absolute growth rate (AGR), relative growth rate (RGR) and growth efficiency (E_G) calculated from the differences between the first and second readings for aboveground biomass showed that the higher rate of fertilizer application recorded greater values of AGR and RGR. However, no trend was observed for E_G . Overall results suggested that the medium fertilizer rate can maximize the production of Kenaf planted in BRIS soils effectively.

Keywords: kenaf, fertiliser, photochemical efficiency, growth, physiology and BRIS soil

Locating Sediment Trap Using Hydro-GIS Process

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ABSTRACT

In any land development activities, installation of sediment trap is often a must to reduce the impact of downstream sedimentation. However, environmental planners and engineers faced with various options and subjective question in identifying the most suitable location of the sediment trap. In this study, a method for siting sediment trap or basin for a new construction area was developed and tested to a 5 acre land. The method involved development and application of hydro-GIS process. Two main spatial input used in the process which are hydrological and land use data. Topography, soil erosion and drainage represents the input for hydrology while public property, distance to construction site and location of major stream represents input for land use. Initially DEM for the area was generated from topographic map using Arc GIS. The flow direction was determined using the pour point algorithm which then used to simulate the run off in the area and flow accumulation was calculated by summing the cell areas of all up slope cells draining into it. The soil loss was then estimated for cell using USLE within the GIS platform. The distance to construction site, public property and major stream was then spatially analyzed with the output of hydrological process to identify best location for installation of sediment trap. This method provides a more objective valuable tool for site selection of sediment trap in any environmental impact study involving land development activities.

Keywords: sediment trap, environmental impact assessment, hydro-GIS



Comparison of Heavy Metal Concentrations (Cd, Cu, Fe, Ni and Zn) in the Shells and Different Soft Tissues of *Anadara granosa* collected from Jeram, Kuala Juru and Kuala Kurau, Peninsular Malaysia

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ABSTRACT

The concentrations of Cd, Cu, Fe, Ni and Zn were analysed in different parts (shells, mantle plus gills and foot plus visceral mass) of the red blood cockle *Anadara granosa* collected from an anthropogenic-receiving site at Kuala Juru, relatively unpolluted sites at Jeram and Kuala Kurau. The metal concentrations ($\mu\text{g/g}$ dry weight) in the total soft tissues of *A. granosa* were 1.30-9.44 (mean: 4.69) for Cd, 91.9-203.5 (mean: 130.2) for Zn, 0.80-16.15 (mean: 7.67) for Ni, 455.91-1125.5 (mean: 715.3) for Fe and 5.41-7.39 (mean: 6.14) for Cu. Although the highest concentrations of Cu and Zn were found in the soft tissues of Kuala Juru's cockles, these metal concentrations were lower than the maximum permissible limits established by Malaysian Food Regulations 1985 and WHO standard guidelines but the Cd concentrations from Jeram's cockles, were higher than the maximum permissible limit established by the both guidelines. As suggested by many reported studies found in the literature, regular biomonitoring of heavy metal concentrations at these three sites is needed since the edible *A. granosa* is a popular commercial bivalve in Malaysia.

Keywords: heavy metal concentrations, shells, soft tissues, *anadara granosa*, Jeram, Kuala Juru, Kuala Kurau

