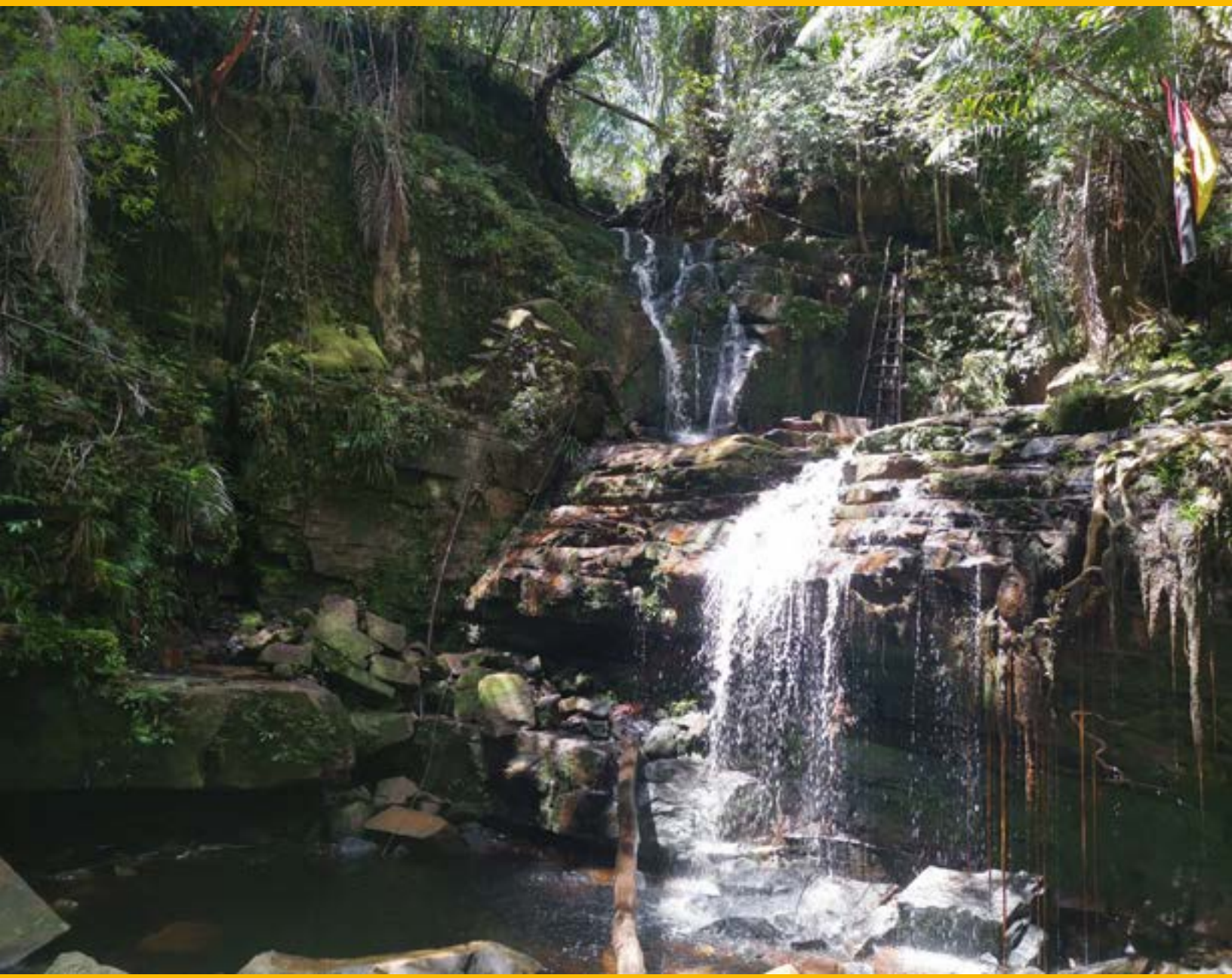
IBEC BULLETIN

UNIVERSITI MALAYSIA SARAWAK

VOL. 3: ISSUE 2

JUNE 2022

http://ir.unimas.my/id/eprint/38629
E-ISSN: 2716-6422



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Front Cover: Arong Serait Waterfall, Kampung Selabat, Bako. Photo credit @ Wong SY

Event

On 24th March 2022, TVS broadcast the latest achievements of IBEC academicians with an interview with A.P. Dr Mohd Azlan. A.P. Dr Mohd Azlan emphasized the research efforts of all IBEC academicians, especially for year 2021, wherein 27 new species of animals and plants were published.

Event

PROF. DR INDRANEIL

Conference Director
The 10th World Congress of Herpetology 2024
Kuching, Sarawak, Malaysia

The Bornean Rainbow Toad had not been seen after 1924. But in 2011, this narrative changed. Two university students joined lecturer and conference director Prof. Indraneil Das (10th Congress of Herpetology 2024) on a hunt for the lost Bornean Rainbow Toad.

The film is based on the true story of Indraneil's rediscovery of the Bornean Rainbow Toad in 2011. The rediscovery marked Sarawak as a herpetology hotspot and inspired the creation of a limited edition branded watch piece.

A video promoted by BE Sarawak. https://www.youtube.com/watch?v=eq1M95XKdmg

New book release

- **LIFE FROM THE HEADWATERS TO THE COAST: SAMUNSAM WILDERNESS REDISCOVERED**
- **EDITED BY JAYASILAN MOHD-AZLAN, ABANG ARABI ABANG AIMRAN & INDRANEIL DAS**

Avian Diversity, Density and Foraging Ecology in an Oil Palm Plantation and in High Conservation Value (HCV) Areas in Sabaju Oil Palm Estate, Bintulu, Sarawak, Malaysia

Nur Sarah binti Muhammad Fadhil Choong

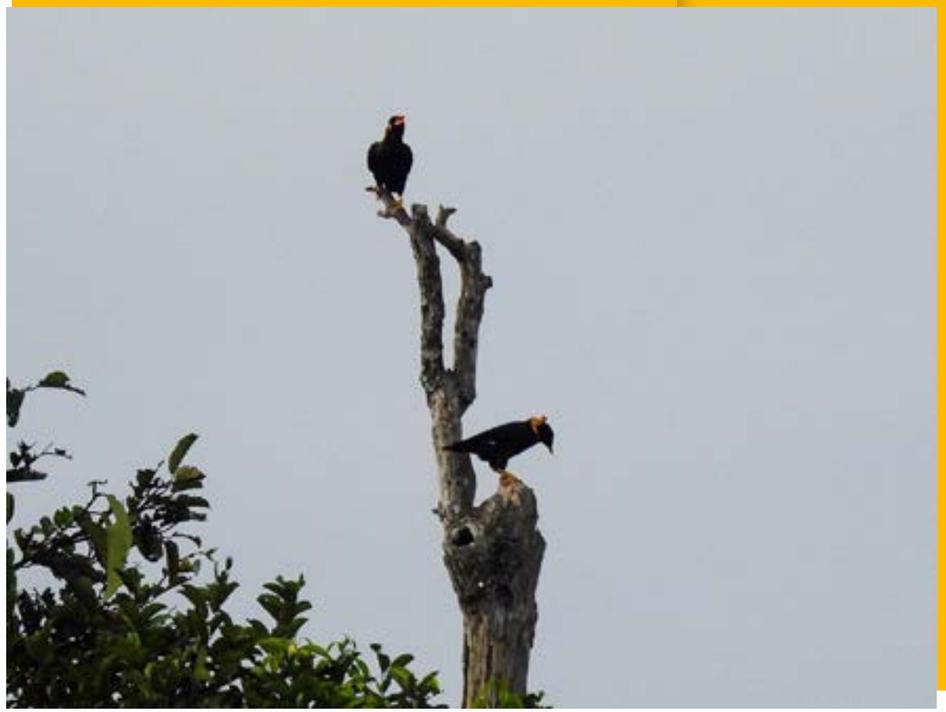
Oil palms (*Elaeis guineensis)* have been established as an important crop in the wet tropics. Although the crop is valued globally, when not done sustainably it can cause a drastic effort on the biodiversity of the area. Therefore, conservation efforts should be made to ensure the biodiversity of the area is maintained as biodiversity is important for the sustainability of oil palms. This study will help in understanding the current situation of the diversity, density, distribution, and foraging ecology of birds in an oil palm plantation and high conservation values around the area to further understand what type of further conservation efforts are needed.

The objectives of this study are to analyse the density, diversity, and distribution of birds, to assess the influence of habitat heterogeneity on birds, and to identify the foraging ecology of birds both in an oil palm estate and in the high conservation value (HCV) areas. The methods that were chosen for this study to observe the birds are point count and line transect distance sampling. A total of five transects were chosen that covered almost all of the areas surrounding the border between the HCV areas and the oil palm estate. Selecting the location of the transect will help in comparing the diversity, density, and foraging ecology of the birds between the two habitats. Observations will be done using binoculars and audio will be recorded and analysed using the Olympus Digital Recorder. Habitat parameters that will be included to study habitat heterogeneity are the canopy cover, number of trees (Diameter Breast Height), shrub percentage, distance from nearest river, and elevation. Foraging ecology will be based on parameters such as foraging height, foraging substrates, type of food, and foraging techniques. The birds will be characterised based on their feeding guilds such as carnivore, omnivore, insectivore, etc.

Once this study is published, hopefully, it will contribute as a guideline for future conservation efforts in maintaining the biodiversity in palm oil areas to maintain its sustainability in the long run.

Greater coucal (*Centropus sinensis*)

Black-throated babbler (*Stachyris nigricollis*) (above) and two hill mynas (*Gracula religiosa*) below)



Molecular Identification of Plant Growth Promoting Rhizobacteria Indigenous to *Metroxylon sagu* Rottb.

Flonia Benet

Exploiting Plant Growth Promoting Rhizobacteria (PGPR) from phytomicrobiome as a bioinoculant, is beneficial for sustainable agriculture. In this study, with an aim to identify PGPR indigenous to *Metroxylon sagu* Rottb., the isolation of PGPR was done by culture-dependent method. Considering numerous Plant Growth Promoting (PGP) traits, the preliminary screening of PGPR was done by spread plate method on nitrogen free medium, Burks Agar. These nitrogen fixers then were randomly selected, and the genetic differences of these microbial strains were determined by (GTG)5 method.

A total of eight isolates representing each clusters deduced, were identified using 16S rDNA sequencing. These isolates were identified as *Pseudomonas* sp., *Pseudomonas monteilii*, *Pseudomonas extremaustralis*, *Bacillus* sp., *Bacillus thuringiensis*, *Bacillus subtilis*, *Serratia marcescens,* and *Staphyloccoccus sciuri*. Concerning the PGP traits of these isolates, the percentage of positive reactors as phosphate solubilizer, IAA producer, siderophore producer and ammonia producer were 100 %, 87.5 %, 87.5 % and 100 %, respectively. Further, the PGP activities of these isolates were assessed according to bonitur scale with *Pseudomonas* sp. being on top of the rank, suggesting being the most promising PGPR isolated.

Further study such as field trials towards the effectiveness of the identified microbes in vivo, were suggested.

***Metroxylon sagu* Rottb. at sampling site, Dalat District**

Nur Azzah Osman

Isolation and characterisation of sulphate reducing bacteria (SRB) from peat soil of oil palm plantation, forest and agriculture area

The soil biota of tropical peatlands, particularly the microbial community, plays an imperative role in maintaining soil productivity and regulating biogeochemical cycles such as the sulphur cycle. Sulphur is the fifth most abundant element on earth, and the transformation of the sulphur element in the environment is critically dependent upon microbial activities of the sulphate-reducing bacteria (SRB). Sulphate-reducing bacteria are a diverse group of microbes in the microbial community that reduce dissimilatory microbial sulphate, an important metabolic process in many environments such as anoxic soil and groundwater.

Studies related to the sulphate-reducing bacteria inhabiting oil palm plantation and agricultural area are lagged behind in Sarawak. In addition to that, the microbial community in several ecosystem types, such as oil palm plantations and agricultural areas, is not well documented in tropical regions. Most research related to microbial community focuses on one particular ecosystem, such as forest.

Thus, in this study, the role and behaviour of the microbial community, mainly the sulphate-reducing bacteria, in the peat soils of oil palm plantation, forest and agricultural area will be studied. The study of the microbial community, especially the sulphate reducing bacteria on different land uses, may bestow upon the understanding and awareness of the effect of land uses on the microbial community of peat soil. Furthermore, it is necessary to understand the role of the microbial community in sustaining the growth and productivity of economically important crops.

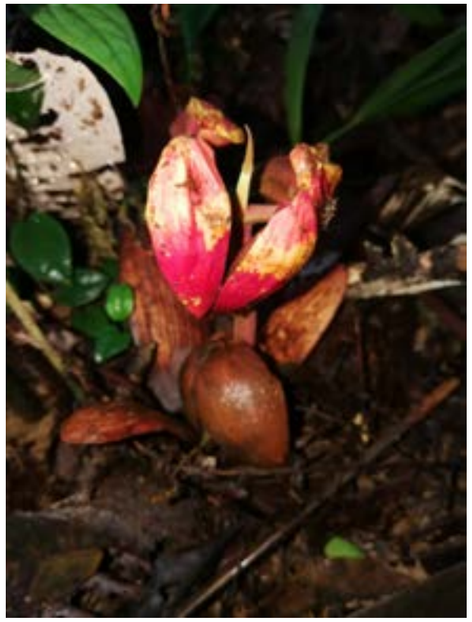
Sebungan oil palm plantation

Sabaju forest

Agricultural area located near a longhouse in Sebauh, Bintulu

Ogary K. Migas

Taxonomy and Phylogenomics of *Shorea* section *Pachycarpae* (Dipterocarpaceae)



Engkabang: Leaf shoot (left) and germinating fruit (right)

The Illipe nut and its product—the Illipe butter—wrote Bertram Smythies back in 1958, covered various groups of oilseeds. This included the true Illipe nuts (*Bassia longifolia*) and Mowrah nuts (*Bassia latifolia*) of South India, the Siak nuts (*Palaquium* spp.) from Sumatra. Then there are the Illipe nuts from Sumatra and Borneo, derived from certain species of *Shorea* in the family Dipterocarpaceae.

The Illipe butter is a traditional export commodity from Borneo, coming from Sarawak and West Kalimantan specifically. The term engkabang is used here in Sarawak to refer to these oil-seed-bearing species. Engkabang is identified with 14 *Shorea* species of which nine are iterated as having commercial importance. Back in the 50s, it was denoted as an ideal cocoa butter substitute for use in the confectionary industry—particularly sweets and chocolate. Other minor uses are for soap-making, medical products, lubricants, and cosmetics.

The tumultuous fruiting period of the dipterocarps and its rather niche primary role as substitute or cocoa butter equivalent translated to an unsaturated and small market representation. Interest in the Illipe butter industry faded in the late 80s when industrious logging concessions come into play.

Traditional processing of the fruits to its butter starts with the removal of calyx lobes or modified sepals prior to drying out under the sun for a few days until the fruits turn black.

Once dried, the outer skin is peeled, and the flesh is taken and pounded with wooden mortar and pestle. The next step is to steam the pounded flesh. After the steaming is the squeezing of the solid to remove the moisture—that is a separated mixture of fat and water. This fat is collected into pieces of cut bamboo.

The butter encased in bamboo is generally for local consumption—a delicious vegetable fat. For international trade, the product is in the form of dried oilseeds.

The Illipe nut species in Borneo are found in *Shorea* section *Brachypterae* (Red Meranti), sect. *Mutica* (Red Meranti), sect. *Pachycarpae* (Red Meranti), and sect. *Shorea* (Selangan Batu). *Shorea* section *Pachycarpae*, in particular, has five representations out of the 14 important engkabang in Sarawak. The mainstay of the study put special emphasis on section *Pachycarpae*.

There are 11 members of the section Pachycarpae here in Sarawak, *Shorea amplexicaulis* P.S. Ashton, *S. beccariana* Burck, *S. macrophylla* (de Vriese), *S mecistopteryx* Ridl., *S. pilosa* P.S. Ashton, *S. pinanga* Scheff, *S. praestans* P.S. Ashton, *S. rotundifolia* P.S. Ashton, *S. splendida* (de Vriese) P.S. Ashton, *S. stenoptera* Burck, and *S. woodii* P.S. Ashton. All members of section *Pachycarpae* in Sarawak are endemic to Borneo. Two of which are only found in Sarawak (*Shorea praestans*: Critically Endangered; *Shorea rotundifolia*: Critically Endangered).

Shorea sensu Ashton is currently the mainstream morphological classification with 11 sections and eight subsections. Morphological classification is limited by the number of observable morphological characteristics that differentiate one section from another. *Shorea* section *Pachycarpae* however, is iterated as the least defined compared to the other 10.

Recent phylogenetic studies based on molecular markers and morphology have better traction with earlier works on the genus *Shorea*. Heim and Maury-Lechon's interpretation considered the delimitation of the genus *Shorea*. However, only a few members of section *Pachycarpae* have been included in recent molecular studies.

Herein, we want to investigate further into the phylogenomic by including the commercially important illipe nut species of section *Pachycarpae* (*Shorea beccariana*, *S. macrophylla*, *S. splendida*, and *S. stenoptera*), and one species from section *Shorea* (*Shorea seminis*).

The study aims at exploring the phylogenomic relatedness from plastid genomes of these five engkabang species. In addtion to this, effective advocacy for engkabang cultivation must be accompanied by an understanding of the floral biology, particularly the flowering patterns of semi-wild engkabang populations.

Engkabang nut floating in the river

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