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INTROPica

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Green Innovations For Sustainable Future

International **YEAR OF FOREST 2011**

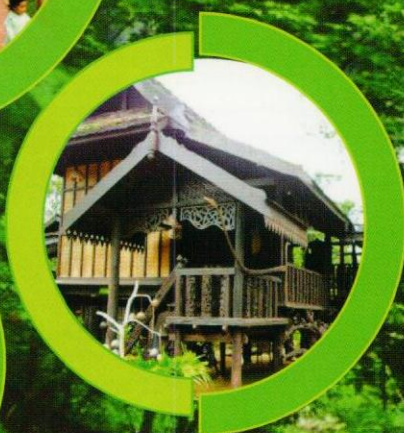
**BIOCOMPOSITE ■
(PG 11) CORNER**

**INTROPIKEDIA ■
(PG 33)**

**■ HIGHLIGHT
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**■ FOCUS
(PG 15)**

**■ ACTIVITIES
(PG 27)**



"FOREST FOR PEOPLE"



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Words from Editor

As we celebrated Forest International year for 2011 recently, we should take a moment's pause from our busy lives to ponder what our forest heritage means to us and to mankind in general.

As citizens, we Malaysians have over the years developed sufficient public awareness to appreciate the forest which covers about 30% of our landmass. Most of us may know the benefit brought by sustaining the forests – climate stability, water sources, slope and soil protection, wildlife refuge, recreation and ecotourism, livelihood for the Orang Asli and local communities, and not to mention a hefty contribution to the national economy by the wood-based sector, totaling about that initiated earth's biosphere, evolutionally perception on or forest heritage.

This has also brought some activism among members of the public to defend the forests when its security and integrity are threatened as in river siltation and health due to injudicious logging activities, wildlife poaching, outright encroachment or threat on near-extinct or rare species. Such public concerns strengthen further the impressive formal legislations and policies the government has introduced over the years to ensure forest reserve sustainability and security.

This conventional knowledge-cum-appreciation of the forest may not truly convey the ultimate meaning of this priceless heritage to mankind. We need a geological perspective to group this reality & appreciate indebtedness and this fitrah from the Almighty. According to current scientific theory the universe is about 13.7 billion years old and the earth was created about 4.5 billion years ago. The planet-building inorganic phase took 4.5-3.8 billion years before the advent of unicellular marine life around 3.5 billion years ago. Another major milestone was the creation of chlorophyll-bearing marine organisms which began releasing O₂ into the nascent atmosphere at about 2.3 billion years ago. Gradually

the atmospheric layer thickened while life proliferated in the oceans. Plant life first invaded the empty land around 475 million years ago before the first animals dragged themselves on the pristine shorelines at about 200 million years ago.

The land ecosystem developed into its next milestone, the advent of trees around 398-385 million years ago (mid-Devonian epoch). With forest sprouting the globe the stage was set for dominion by larger animal species including the 150 million-year reign of the dinosaurs which ended spectacularly and abruptly around 70 million years ago. The forest dominated ecosystem thus set the evolutionary stage for the animal species evolves destined to rule the world.

It was to pioneering green microorganisms that initiated earth's biosphere, evolutionally its complex ecological system, which enabled the planet to evolve complex life. It was under the tree ecosystem that the first hominids made their precarious about 3 million years ago. Taking the measure on the geological clock with the age of the planet set at 24 hours, man made his stellar appearance at about 11.58, just 2 minutes before midnight.

The forest provide the primordial environment where we *Homo sapiens*, mankind, took our first steps and evolved our culture as thinking beings. The forests however continued throughout to provide us protection and sustenance. And yet it is as crucial that the earth's cradle that nurtured early *Homo sapiens*, be sustained to provide holistic nourishment to future generations. We should learn to appreciate the geological role played by the forest ecosystem in monitoring our early survival and later evolution. To destroy this cradle is tantamount to destroying ourselves. It is perhaps timely, in celebrating Forest day this time around, for us to pause and ponder what the forest have really meant to us as a species and as *fitrahs* from the Almighty, and how influential it is to our very destiny.

Editor

International Year of Forests 2011

International Year of Forests 2011 (forest 2011) is a global celebration of people's action for sustainable forest management. The year's theme of Forests for People highlights this relationship and role in ensuring forests' well-being and development.



Logo

The Forests 2011 logo was designed to convey the year's theme of "Forests for People," celebrating our role in sustainably managing, developing and conserving forests worldwide. Each icon in the design depicts the multiple values of forests and the need for a 360° degree perspective on the resources they provide: shelter and habitat to people and biodiversity, food, medicine, clean water and a stable global environment. The message is clear, forests

are vital to the survival and well being of all. The logo has been translated into over 40 languages.

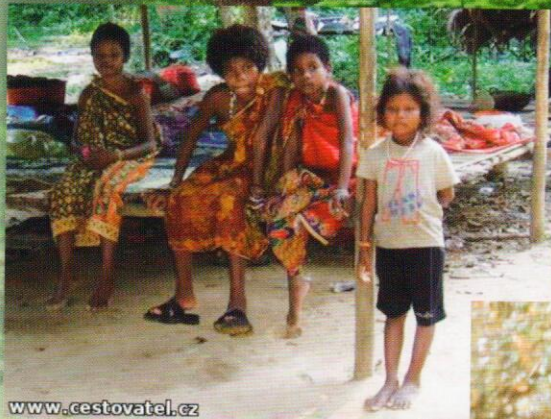
The Collaborative Partnership on Forests (CPF) is a voluntary arrangement among 14 international organizations and secretariats with substantial programmes on forests. The CPF's mission is to promote the management, conservation and sustainable development of all types of forest and strengthen long term political commitment to this end.



- * Center for International Forestry Research
- * Food and Agriculture Organization of the United Nations
- * The International Tropical Timber Organization
- * International Union for Conservation of Nature
- * The Global Network for Forest Science Cooperation
- * Secretariat of the Convention on Biological Diversity
- * Global Environment Fund
- * United Nations Convention to Combat Desertification
- * United Nations Forum on Forests
- * United Nations Framework Convention on Climate Change
- * United Nations Development Programme
- * United Nations Environment Programme
- * World Agroforestry Centre
- * The World Bank

Global Objective

In order to strengthen global efforts to improve the state of forests, the UNFF has adopted four Global Objectives which focus on reversing forest loss, enhancing forest-based benefits, increasing sustainably managed forests and mobilizing financial resources.



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Borneo cave entrance amid the rain forest

Photograph by Matthew Klum

NATIONAL GEOGRAPHIC

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Reverse Forest loss

GLOBAL OBJECTIVE 1: Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation.

Enhance Forest Based Benefits

GLOBAL OBJECTIVE 2: Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people.

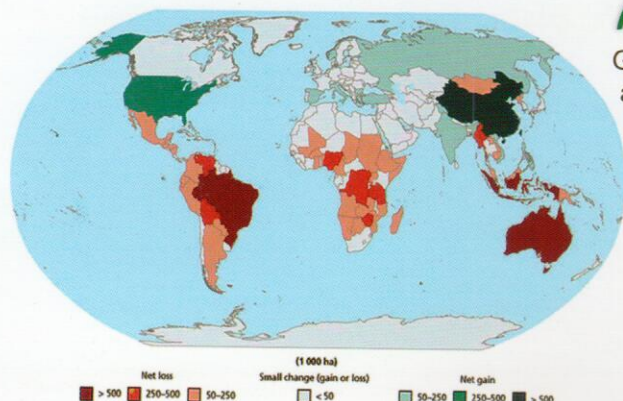
Increase Sustainability Managed Forests

GLOBAL OBJECTIVE 3: Increase significantly the area of sustainably managed forests, including protected forests, and increase the proportion of forest products derived from sustainably managed forests.

Mobilize Financial Resources

GLOBAL OBJECTIVE 4: Reverse the decline in official development assistance for sustainable forest management and mobilize significantly-increased new and additional financial resources from all sources for the implementation of sustainable forest management.

FIGURE 5 Annual change in forest area by country, 2005–2010



Forest Graph

Source: United Nation website
<http://www.un.org/en/events/iyof2011/>

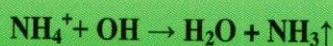
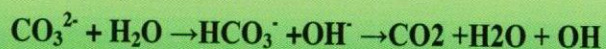
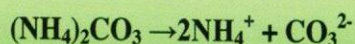
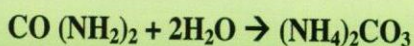
Annual Change in Forest Area by Country 2005–2010

MICRONUTRIENT COULD WORK AS UREASE INHIBITOR

By Nasima Junejo, PhD

Nitrogen is an essential nutrient to meet our ever growing need for food, feed and fibre. Nitrogen can be used only its reactive forms which include inorganic forms such as NH_3 , NH_4 , NO_2 , HNO_3 , N_2O , NO_3 etc., and organic forms such as urea which are important element of N cycle. The natural formation of reactive forms of N is too low. So, fertilizer application is crucial to meet the needs of agriculture, as it plays a major role in improving growth and yields. It has been observed that 30% surface applied N was lost, especially when it applied as Urea or ammonium form of fertilizer. Urea is most commonly source of N fertilizer when urea is applied to soil it is rapidly hydrolyzed to $\text{NH}_4\text{-N}$ and subsequently transform to $\text{NO}_3\text{-N}$. The $\text{NH}_4\text{-N}$ is subjected to gaseous loss through NH_3 volatilization, while NO_3 is subjected to denitrification and leaching losses. The N loss from applied urea can be as high as 50%. This constitutes an important economic loss. The NO_3 that undergoes denitrification is reduced to N_2 and N_2O and escape to the atmosphere. Nitrous oxide is a potent greenhouse gas that has the global warming potential of 310. In a recent study (Singh et al., 2008) it was also reported that N_2O can deplete the O_3 layer allowing more ultra violet light to enter the earth resulting in increased global temperature. The NO_3 leaching can reduce plant N uptake and can cause NO_3 pollution of the ground water. Due to both economic and environmental concerns the interest on improvement of urea efficiency has received worldwide attention.

Hydrolysis of Urea in Soil



Use of Urease inhibitors is one of the most successful strategies to reduce N losses from surface applied urea. UIs (Urease Inhibitors) slow the conversion of urea to NH_4^+ by inhibiting the urease enzyme, which reduces the NH_4^+ concentration in the soil solution and, hence, lowers the potential for NH_3 volatilization and seedling damage; slow urea hydrolysis allows more time for it to release nitrogen from the fertilizer micro site. Many research studies have confirmed that inhibitors are effective in delaying the conversion of either urea to NH_4^+ (UIs) or NH_4^+ to NO_3^- (NIs). Most research has shown that the application of UIs to soil with urea reduces NH_3 volatilization and N_2O emissions. A number of compounds have been tested for their inhibitory effects to improve the efficiency of urea, however, most of them has limited use due to their high cost and lack of availability (Ahmed et al., 2008). In addition, some of the urease inhibitors are phyto-toxic and are banned in most parts of the world (Watson, 2009).

The use of micronutrients, such as Cu and Zn were found as nontoxic, easily available and nutritious type of urease inhibitor which is effective to reduce ammonia loss of surface applied urea from agricultural fields (Junejo et al., 2009). Before describing the inhibitory effects of micronutrient such as Cu and Zn; it is important to understand their role in plant production and status in soil. Copper is an essential element for all crops, and it influences both carbohydrate and nitrogen metabolism in plants (Mengle and Kirby, 1987). Cu is present in soils as oxides, carbonates, silicates and

There are several strategies that have been adopted to reduce ammonia volatilization loss, such as;

1. Modification in placement, rate and method of fertilizer application.
2. Amendment and coating of urea with soluble salts of Calcium, Potassium, and magnesium.
3. Controlled/Slow release fertilizers (CRF/SRF).
4. Use of Inhibitors.
5. Use of plant-growth promoting microorganisms in reducing nitrogen losses

sulphides. Copper availability decreases in soil solutions due to adsorption of Cu in soil exchange complexes as well as due to chemical fixation of Cu as sulphides (Lea et al., 1993). Zinc is also an essential nutrient that plays an important role in plant growth, and Zn is an important part of protein that works as a synthesizer of sugars and starch (Sharma, 2006). Zinc is the most common crop micronutrient deficiency, particularly in high-pH soils. Notably, 50% of cultivated soils in the world are classed as Zn-deficient (Alloway, 2004).

As urease inhibitor, Cu and Zinc inhibit the activity of urease enzyme which is responsible for urea hydrolysis by replacing the molecules from urease enzyme bodies made of Ni and the complex formation at the active site caused inhibition in enzymes activity. The application of Cu coated urea (Figure 1 & 2) reduced hydrolysis process and microsite pH 20 to 30 percent (Figure 2) from soils; resulting in reduction of ammonia loss (Table 1) and nitrogen mineralization (Junejo et al., 2012).

| Treatments | NH ₄ volatilization loss (%) | | | Means |
|---------------------|---|----------|----------|-------|
| | Serdang | Munchong | Holyrood | |
| Urea | 38 a | 44 a | 58 a | 47A |
| Cu coated urea | 28 b | 38 b | 39 c | 35B |
| Cu & Zn coated urea | 28 b | 31 c | 46 b | 35B |
| Means | 26.5C | 36.3B | 44A | |

The values with same capital letter within means of treatments columns and rows (soils) and the values with same small letter within columns are not significantly different at $P>0.05$ (Junejo et al., 2011).

The field evaluation of micronutrient coated urea indicated a 30% increase in various crops yields and N uptake improved by 28.3 and 23.9% because reduced nitrogen losses and micronutrient supply (Junejo et al., 2011). The concept of releasing more than one nutrient through one source is useful for improving the efficiency of chemical, when such alternatives are applied. Modification of urea with micronutrients is economically and environmentally useful in large agricultural fields.

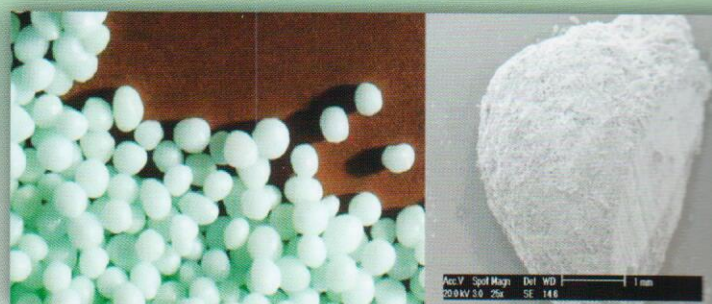


Figure 1 : Micronutrient coated urea ((Junejo et al., 2009)

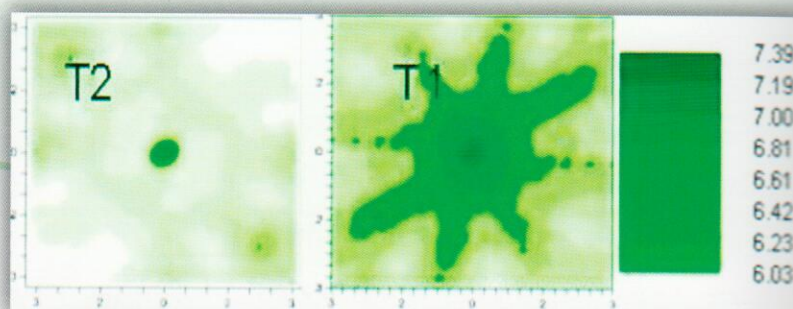


Figure 2 : Effects of uncoated urea (T1) and urea coated with Cu (T2) on urea hydrolysis and microsite pH from Serdang soil series (Junejo et al., 2011).

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CHARACTER ASSESSMENT OF SPECIES GROUP OF MALESIAN ASPLENIACEAE USING MOLECULAR INFERENCE

By: Siti Khadijah Rambe, PhD

Aspleniaceae is one of the biggest families in ferns and is composed of circa 750 taxa. The family is known having world-wide distribution ranging from humid tropical to arid zones (Kramer and Viane 1990). With about 30% of total species in Malesia (Rambe 2002), the region was assumed to be the center of diversity for the family. If a sizeable number of species is endemic to islands (Kramer and Viane 1990), some have reached cosmopolitan distribution. For example, *A. nidus* is spreading from coastal East Africa and Madagascar, over the Indian subcontinent and Malesia, to Australia and islands of the Pacific (Johns 1996). The species occupy various habitats, ranging from the sea level to the top of mountains including the border of volcano craters as illustrated by *A. malayo-alpinum* on Mt. Gede-Pangrango National Park, Indonesia. Many Aspleniaceae species are either epiphyte on basal trunks or occupy the upper canopy area such as *A. nidus*. Few of them are obligated epiphytes (e.g. *A. perakense* and *A. scortechinii*), others are specific to lime stone rock (e.g. *A. adiantoides*), and some have specialized to river banks such as *A. subaquatile* (Kramer and Viane, 1990) and *A. amaroullobulum*.

Members of Aspleniaceae reproduce either sexually and asexually. Asexual reproduction occurs via apogamy or the direct production of young plantlet called gemma (plural gemmae). Apogamy is a formation of new sporophytes without fertilization by the cells of the prothallus. Gemma develops on the frond either near to the rachis, the costa or the vein. The production of gemma is often observed in relation to high moisture and low light intensity. Branching and continuous growth of rhizome is also a natural mechanism of propagation that is commonly used for production in nurseries. In nature, branching rhizomes often form a wide surface coverage commonly observed on many *Hymenasplenium* species. For *Asplenium*, a good example is *A. contiguum* from Gede-Pangrango National Park – Indonesia where a single continuous rhizome was found covering a surface of 5m².

Asplenon was among the ferns mentioned alleviating sleep disorder by Dioscorides in the De Materia Medica (Ruellio 1539) published in the first century (Adanson 1763). In its current form, the name of *Asplenium* is derived from "a", as privative prefix, and "spleen" meaning "sleep" on the account of the supposed property of the fern for curing sleep afflictions (Schneider 1892). It was Linnæi (1738) that proposed this name for ferns with linear sori (singular sorus) encompassing the ones cited

(Figure 1) collected by Pehr Osbeck from Java (Linnæi 1753) close to sea shore area of formerly Sunda Kelapa port. The period following the work of Linnæi from Mid 1700s to the beginning 1900s was the golden era of plant collection. Newly collected fern specimens were proposed as *Asplenium* when linear sorus was the only distinctive character retained. However, new genera were given when linear sori were associated with other morphological characters or the linear sorus was in form of boat shape. Henceforth, based on various morphological characters, there were more than twenty genera proposed within the ferns having linear sorus. These genera were later compiled and proposed as Aspleniaceae by Frank (1877).



Figure 1 : *Asplenium nidus* L.

A classification of the Aspleniaceae using rhizome anatomy was attempted by Hayata (1927 and 1928). On the basis of the rhizome's radial and dorsal-ventral vascular bundles arrangement, he proposed *Asplenium*, *Boniniella* and *Hymenasplenium* for the family.

Asplenium was described as having radial vascular bundles whereas *Boniniella* and *Hymenasplenium* having dorsiventral vascular bundles. The separation between *Boniniella* and *Hymenasplenium* was laid on the character of vein and sori. *Boniniella* possesses reticulate veins and scolopendroid sori in comparison to free veins and linear sori for *Hymenasplenium*. However, other researchers found that morphological characters should prevail over the anatomical ones. As consequence of this disagreement, Aspleniaceae was treated as a single genus family. Copeland (1960) for example ignored the previous establishment of *Asplenium*, *Boniniella*, and *Hymenasplenium*. In addition to linear sori, he described Aspleniaceae (Figure 2) vascular bundle as having an "X" – shape at the upper petiole and two opposite "C"- shape at basal petiole. Akin to Copeland, Holttum (1968) did not recognize the genera within Aspleniaceae. Instead, he proposed the definition of species group in response to the occurrence of morphological affinities.

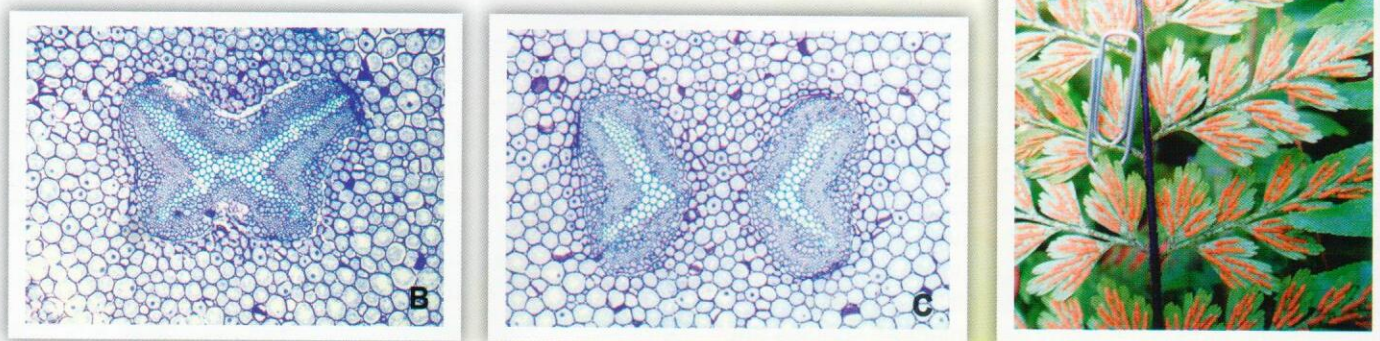


Figure 2 : Character of Aspleniaceae. A. Linear sori; B. "X"-shaped vascular bundle at upper petiole; C. Two "C"-shaped vascular bundle at basal petiole.

As for many other plant families, the absence of objective criteria for character weighting led to a disagreement on which characters genera should be distinguished. If the idea that the classification should reflect the species phylogenetic relations gained wide acceptance, the difficulty of establishing phylogenies on the basis of a small number of morphological character variations hindered further progress in plant taxonomy. This problem found a solution when techniques of DNA sequencing and computed DNA polymorphism analysis became available around 1990 and permitted to evaluate species phylogenies on the basis of the evolution of some of their genes. Molecular inference on ferns was initiated by Hasebe et al (1993, 1994, and 1995). The study indicated Aspleniaceae to be monophyletic. Later Murakini (1995) found that *Hymenasplenium* was a monophyletic group that had most basally diverged from *Asplenium*. However, the previously described distinctions between *Boniniella* and *Hymenasplenium* were not supported by the chloroplastic gene *rbcL* sequence (Murakami 1995). The first attempt to build a phylogeny of the family was conducted by Schneider et al. (2004 and 2005) using a combination of *rbcL* and *TrnL-TrnF* non coding regions onto 71 and 77 samples respectively collected from across the world. Their outcome supported many previous attempts of clarification for instance the relation of *Diellia* with the black-stemmed character of *Asplenium* suggested by Wagner (1952 and 1953a,b). Their other finding confirmed that most previously proposed genera were grouped within *Asplenium*. On the basis of these molecular studies, Smith et al. (2006)

formalized Aspleniaceae having only two genera: *Asplenium* and *Hymenasplenium*. Another study using 400 taxa by (Schuettpelz and Pryer 2007) confirmed previous findings and suggested Blechnaceae, Onoclenaceae, Thelypteridaceae, and Woodsiaceae as sister families of Aspleniaceae. In a later study using *rbcL* and *trnL-trn* region, I (Rambe 2010) used 147 taxa of Aspleniaceae collected from various phytogeographic units to correlate the inferred phylogeny with morphological observations. The outcome of this study revealed an evolutionary trend for the characters of the petiole/rachis and pinna within the Aspleniaceae. The primordial group of *Asplenium* was identified as following: rachis/petiole is circular, aerophore is in form of a developed juncture, pinna is sessile and imbricated, costa is embedded. In contrast, for the developed group: rachis/petiole is sulcate, aerophore is either vestigial or absent, pinna is stalked and free, costa is visible as sulcate or wide. This definition of evolutionary trends within the *Asplenium* permitted to reassess the character choice of previously defined species group by Holttum (1968).

For this assessment, morphological features (Figure 3) were observed on fifty three taxa of Malesian *Asplenium*, selected according to their ability to describe species groups reflecting an evolutionary trend. In comparison to the species group description made by Holttum (1968) that was mentioned to follow the species phylogeny, the outcome of the current study indicated significant differences in the character choices and achieved a higher consistency of selected characters (Table 1). In opposite

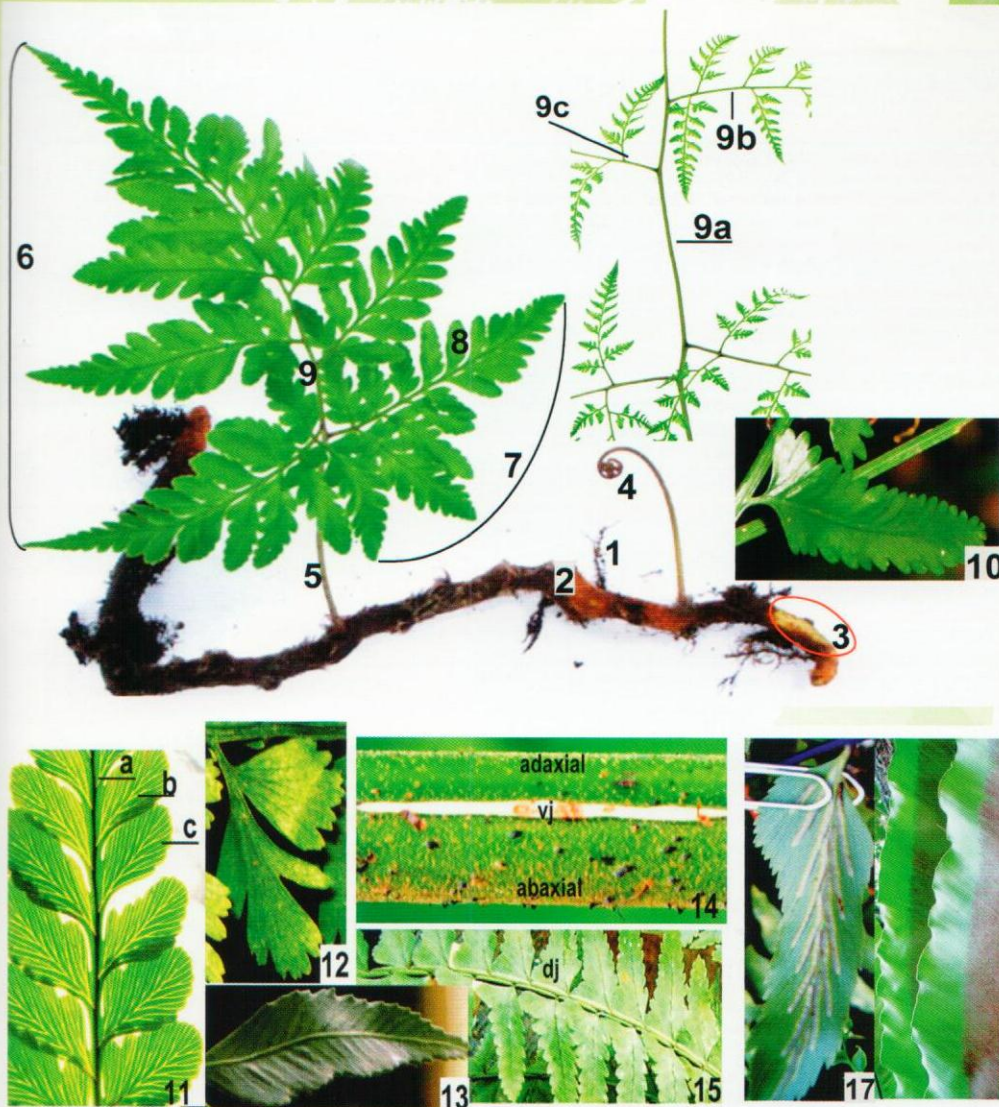
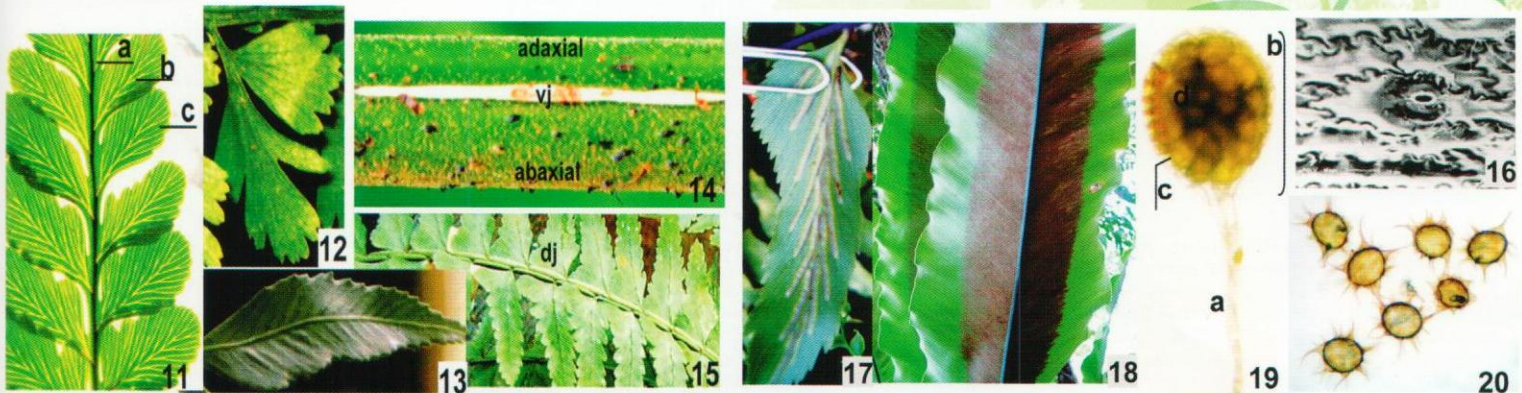


Figure 3 :

Morphology of fern. 1.Root; 2.Rhizome is covered young and old palea; 3.Rhizome tip is exposed as palea removed; 4.Crozier; 5. Petiole; 6.Frond; 7.Pinna; 8.Pinnule; 9.Rachis; 9a.primary branch, 9b. Secondary branch, 9c. tertiary branch; 10.Stalk; 11.Frond vascular bundles: 11a. rachis, 11b. costa, 11c. vein; 12. Trace of vein on the adaxial surface of pinna; 13. Costa on the adaxial surface of pinna; 14. Vestigial juncture (vj) at lateral petiole, 15.Developed juncture (dj) at the lateral sides of rachis; 16.Stomata of polocytic type; 17.Indusia; 18.Sori; 19.Sporangium: 19a. sporangiophore, 19b. sporangium is encapsulated by annulus, 19c. stomium; 19d. spore. 20.Spores are ornamented by spiny decoration of perispore.



to the species groups of Holtum that involved micro morphological characters, the present species groups are based solely on macroscopic characters that can be linked in a logical way (Figure 4). While working with larger number of taxa, I experienced that species groups that can be identified on easily observed characters and that reflect an evolutionary trend facilitated significantly the identification of species in the field as well as the description processes of the taxa.

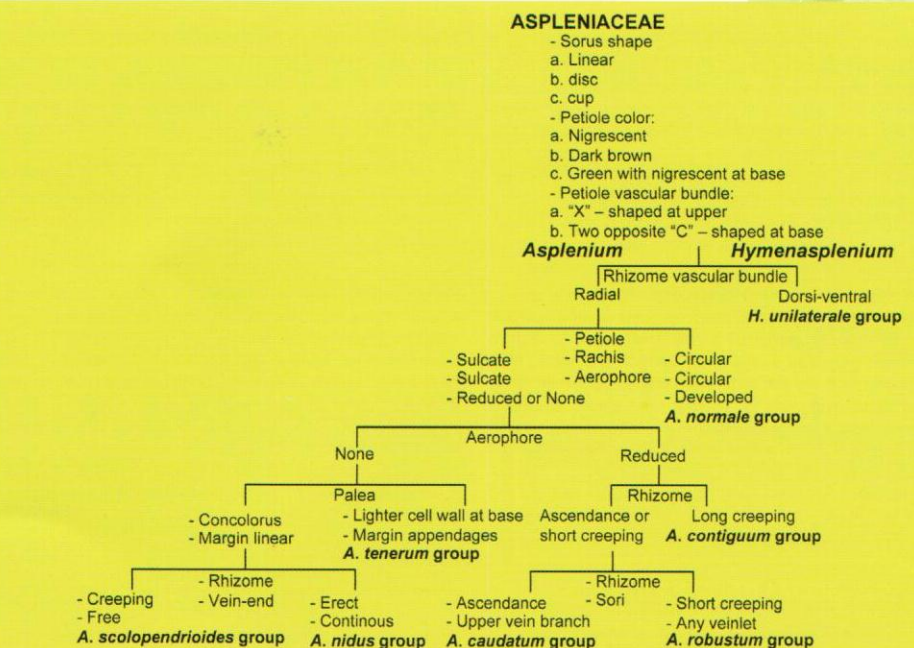


FIGURE 4. Schematic relationship within proposed species groups. Discussed of morphological characters are given in the middle of dichotomous branches. Observed variable characters are given at the terminal of dichotomous branches.

TABLE 1 : Comparison of character used between proposed groups

| Holttum (1968) | Current proposal | Evaluation |
|--|--|--|
| <p>Asplenium caudatum group: Frond is mostly simple; <i>pinnae</i> with various degree of lobes; <i>spore</i> is dark, translucent, with narrower thickened wing; <i>perispore</i> is more folded in addition to the wing.</p> <p>Species: <i>A. caudatum</i>, <i>A. adiantoides</i>, <i>A. logissimum</i>, <i>A. macrophyllum</i>, <i>A. perakense</i>, <i>A. pellucidum</i>, <i>A. spathulinum</i>, <i>A. paradoxum</i>.</p> | <p>Asplenium caudatum group: Rhizome is ascendance; <i>petiole</i> and <i>rachis</i> are sulcate, dull, dark brown; <i>aerophore</i> is reduced; <i>frond</i> is once pinnate, <i>pinna</i> is stalked and free; <i>costa</i> is sulcate on adaxial surface and prominent on abaxial surface; <i>sori</i> is in the upper vein branch and opened towards costa.</p> <p>Species: <i>A. approximatum</i>, <i>A. caudatum</i>, <i>A. horridum</i>, <i>A. longissimum</i>, <i>A. pellucidum</i>, <i>A. schorgessii</i>, <i>A. subavenium</i>.</p> | <p><i>A. caudatum</i> group, <i>A. contiguum</i> group and <i>A. robustum</i> group were observed having perispore which is thick fold and the surface is coarse in various degrees. Nevertheless, describing species group using micro morphology is not suggested as it is not practical during the identification.</p> |
| | <p>Asplenium contiguum group: Rhizome is long creeping, densely covered by dark brown palea; <i>petiole</i> and <i>rachis</i> are sulcate; <i>aerophore</i> is reduced; <i>pinna</i> is chartaceous, stalked and free; <i>costa</i> is sulcate on adaxial surface and prominent on abaxial surface.</p> <p>Species: <i>A. contiguum</i>, <i>A. malayo-alpinum</i>.</p> | <p>No taxa being studied by Holttum.</p> |
| | <p>Asplenium nidus group: Roots have dense root-hairs that commonly form spongy mass; Rhizome is erect; <i>palea</i> is concolorous, clathrate, and margin linear; <i>frond</i> is simple; <i>lamina</i> is coriaceous, apex not proliferous; <i>vein</i> ends are connected and form marginal vein; <i>costa</i> is wide; <i>indusium</i> is reflexed at maturity.</p> <p>Species: <i>A. australasicum</i>, <i>A. curtisorum</i>, <i>A. cymbifolium</i>, <i>A. grevillei</i>, <i>A. musifolium</i>, <i>A. nidus</i>, <i>A. phyllitidis</i>.</p> | <p>Not recognized by Holttum.</p> |
| | <p>Asplenium normale group: Rhizome is erect; <i>petiole</i> and <i>rachis</i> is circular, glabrescent, shiny, nigrescent; <i>aerophore</i> is developed, <i>pinna</i> is sessile; <i>costa</i> is embedded.</p> <p>Species: <i>A. minus</i>, <i>A. normale</i>.</p> | <p>Not recognized by Holttum.</p> |
| <p>Asplenium robustum group: Frond is fairly tough; <i>pinnae</i> is finely dissected; <i>epiphyte</i>; <i>costa</i> with a small ridge; <i>spore</i> is pale, translucent; <i>perispore</i> is rather broad, almost entire wing and has few folds.</p> <p>Species: <i>A. robustum</i>, <i>A. glaucophyllum</i>, <i>A. sublaserpitiifolium</i>.</p> | <p>Asplenium robustum group: Rhizome is short creeping; <i>petiole</i> and <i>rachis</i> are sulcate; <i>aerophore</i> is reduced; <i>pinna</i> is stalked and free; <i>costa</i> is sulcate on adaxial surface and prominent on abaxial surface; <i>sori</i> are situated at veinlet.</p> <p>Species: <i>A. adiantoides</i>, <i>A. amaurobulum</i>, <i>A. laserpitiifolium</i>, <i>A. macrophyllum</i>, <i>A. nitidum</i>, <i>A. perakense</i>, <i>A. praemorsum</i>, <i>A. rockii</i>, <i>A. robustum</i>, <i>A. spathulinum</i>.</p> | <p><i>A. robustum</i> group is also composed by once pinnate frond. The principle comparisons to <i>A. caudatum</i> group are: <i>sori</i> occur at vein-let where the indusium is opened towards the adjacent vein and <i>sori</i> occur at upper vein branch where indusium opens towards costa.</p> |
| <p>Asplenium scolopendroides group: Rhizome is creeping; <i>frond</i> is rather narrow, moderate size, simple frond or simple pinnate; <i>sori</i> of the adjacent vein are often face each other; <i>spores</i> very distinctive; <i>perispore</i> is pale with spine-like.</p> <p>Species: <i>A. scolopendroides</i>, <i>A. borneense</i>, <i>A. batuense</i>, <i>A. scalare</i>, <i>A. nidus</i>, <i>A. phyllitidis</i>.</p> | <p>Asplenium scolopendroides group: Rhizome is creeping; <i>palea</i> is concolorous, opaque and, margin linear; <i>petiole</i> and <i>rachis</i> is sulcate, glabrate, green, dull; no <i>aerophore</i>; <i>pinna</i> is stalked; <i>costa</i> is wide; <i>vein</i> is free. The character of <i>petiole</i> and <i>rachis</i> are not applicable for the simple frond.</p> <p>Species: <i>A. acustiusculum</i>, <i>A. amboinense</i>, <i>A. batuerise</i>, <i>A. borneense</i>, <i>A. paradoxum</i>, <i>A. scalare</i>, <i>A. scolopendroides</i>, <i>A. simplex</i>, <i>A. spathulatum</i>, <i>A. subscalare</i>, <i>A. taeniosum</i>.</p> | <p>The scolopendroid <i>sori</i> occur occasionally. The most remarkable characters for this group within the simple frond are: rhizome is long creeping; <i>vein</i> is free, simple or once forked.</p> |
| <p>Asplenium tenerum group: Rhizome is erect, apex covered with brown palea, bears rosette arrangement of <i>petiole</i>; <i>petiole</i> is light green; <i>frond</i> is simple or simple pinnate; <i>costa</i> broad, rise up on adaxial margin <i>pinnae</i> dentate; <i>indusium</i> is round and pale; <i>spore</i> is pale, opaque, granular, wing with a minutely toothed, thickened edge, moderate width; <i>perispore</i> is anastomosing folded.</p> <p>Species: <i>A. tenerum</i>, <i>A. belangeri</i>, <i>A. scortechinii</i>, <i>A. salignum</i>, <i>A. squamulatum</i>, <i>A. nidus</i>, <i>A. phyllitidis</i>.</p> | <p>Asplenium tenerum group: Rhizome is erect; <i>palea</i> is clathrate, lighter color of cell wall at base, margin appendages; <i>petiole</i> and <i>rachis</i> is sulcate, glabrescent, shiny; no <i>aerophore</i>; <i>pinna</i> is stalked and free; <i>costa</i> is raised on both adaxial and abaxial surface; <i>vein</i> is free; <i>indusium</i> is reflexed at maturity. The character of <i>petiole</i> and <i>rachis</i> are not applicable for the simple frond.</p> <p>Species: <i>A. belangeri</i>, <i>A. prolongatum</i>, <i>A. salignum</i>, <i>A. scortechinii</i>, <i>A. squamulatum</i>, <i>A. tenerum</i>, <i>A. vulcanicum</i>.</p> | <p><i>A. tenerum</i> group is separated from the rest of species group on the basis of <i>palea</i> character which the cell wall is lighter color at base and margin is appendages. Within the simple frond, <i>A. tenerum</i> group is identified from <i>A. nidus</i> by having free vein and from <i>A. scolopendroides</i> by having erect rhizome.</p> |
| <p>Asplenium unilaterale group: Rhizome is creeping; <i>spore</i> is dark with wide transparent wing, edge is uneven, often toothed; <i>perispore</i> is anastomosing folded.</p> <p>Species: <i>A. chelisorum</i>, <i>A. excisum</i>, <i>A. normale</i>, <i>A. subnormale</i>, <i>A. unilaterale</i>.</p> | <p>Hymenasplanium unilaterale group: Rhizome is long creeping; <i>petiole</i> is glabrescent.</p> <p>Species: <i>A. apogamum</i>, <i>A. cheilosorum</i>, <i>A. excisum</i>, <i>A. obscurum</i>, <i>A. subnormale</i>, <i>A. unilaterale</i>.</p> | <p>Dorsi-ventral vascular bundle is character for <i>Hymenasplanium</i>. Character of genus should not be applied to define the species group. Nonetheless, <i>A. normale</i> is species member of <i>Asplenium</i>.</p> |

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Development of A New Kenaf Bast Fiber-reinforced Thermoplastic Polyurethane Composite

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and Edi Syams Zainudin^c, PhD

Natural fiber-reinforced polymers are attracting more notice due to benefits such as less abrasiveness to equipment, renewability, biodegradability, and reduction in weight and cost. Polyolefins have been widely used in natural fiber composites. Polyolefins have lack of compatibility with natural fibers. The reason behind the incompatibility is the hydrophobic nature of polyolefins and the hydrophilicity of natural fibers. This article will highlight new kenaf bast fiber-reinforced Thermoplastic Polyurethane (TPU) composite. In case of TPU this incompatibility barrier will not take place because of its hydrophilic nature.

No previous research has been done on natural fiber reinforced with TPU; however TPU has been compounded with synthetic fibers such as glass, aramid, and carbon fibers. TPU is more expensive than most polyolefins used in the field of natural fiber composites. Meanwhile, it has unique properties when compound with natural fibers. One of the most important properties that can be found in the TPU when compound to natural fibers - that is not found in polyolefins natural fiber composites - is the high strain. TPU-natural fiber composite can reach 35% strain without any treatment, while most polyolefins natural fiber composites cannot reach 10% strain. With some treatment TPU/KF reached 70% strain.

Kenaf (*Hibiscus cannabinus* L.), a fiber very similar to jute, is produced in small quantities of around 500,000 tons annually. In 1960, The United States, Department of Agriculture selected Kenaf as the top candidate for intensive utilization research after screening more than 500 plant species for their potential in pulp and paper making. Kenaf has a short growing period, high biomass output and good mechanical properties. It reaches 3-4 meters in 4-5 months. It can yield two or three harvests a year in tropical climates. It can produce 5-10 tons of dry fiber per acre. Two types of fibers can be extracted from this plant; bast fiber which is the outer layer, and core fiber which is the inner layer. Bast and core fibers are significantly different. Bast fiber represents nearly 1/3 of the plant and core represents the rest. These two parts have different applications. The bast fibers have been used traditionally in the manufacture and trade of cordage products such as burlap cloth, twine, and ropes.

Kenaf is planted commercially in China, Myanmar, India, Bangladesh and Thailand. Malaysian government has paid more attention towards planting Kenaf. It is a candidate to replace tobacco. Malaysia Tobacco Board (MTB) will be renamed to become Malaysia Kenaf and

Tobacco Board, to facilitate the way for farmers to plant Kenaf instead of tobacco. Since 2000, more than RM 48 million have been spent by Malaysian government on research of Kenaf plantation and utilization.

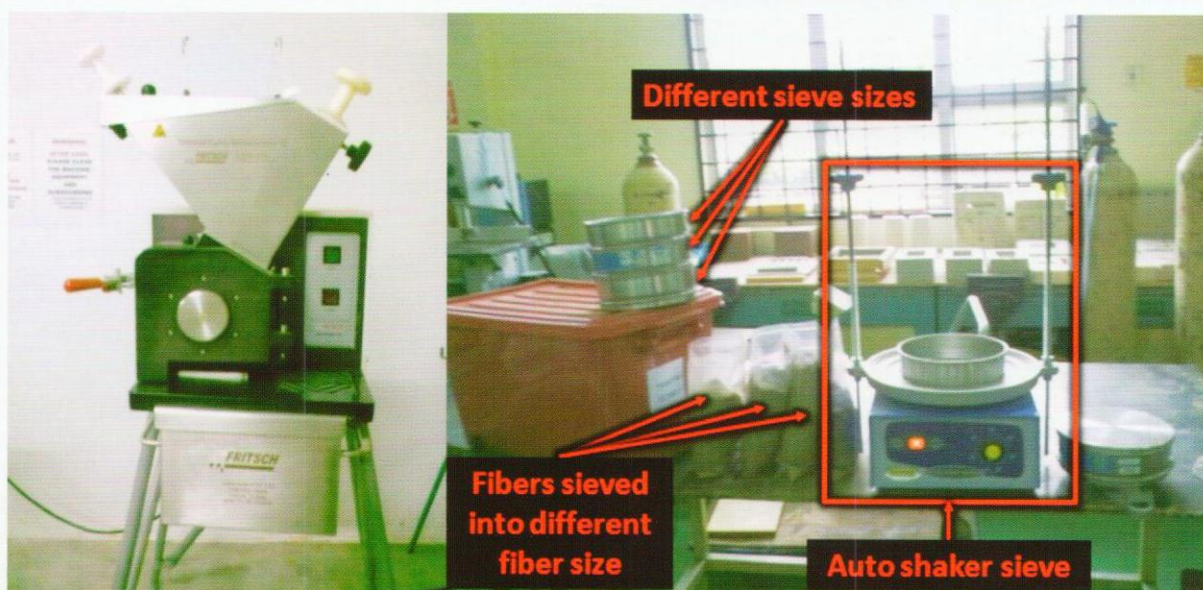
In general, polyurethane is a combination of polyols and isocyanates. Polyols represent the soft segments, and isocyanates represent the hard segments that impart rigidity to the polymer. Isocyanates are petroleum driven and the most used isocyanates are toluene diisocyanates TDI and diphenylmethane diisocyanate MDI. Polyols are divided into two groups: petroleum and bio-based. Petroleum polyols can be classified into three groups: polyether, polyester and polycarbonate polyols. Polyether polyols represent 90% of the commercially available polyols. Bio-based polyols are derived from renewable resources such as plant oils, wood, carbohydrates, lignin, cashew shell, and cork. Polyurethanes can be both a thermoplastic (TPU) and a thermoset (PU). The most important difference between both is that thermoplastics are linear polymers, which normally need no cure during consolidation into a composite. TPUs are reformable, therefore recyclable. PUs are crosslinkable polymers, and not reformable.

TPU is available, as most thermoplastics, in pellet form. Both non-reinforced and reinforced pellets can be purchased commercially. The reinforced pellets contain very short fibers up to about 35% loading. Polyurethane has got a vast range of applications. Automotive, construction, furniture and mattress, and technical insulation industries are the major consumers of polyurethane. Polyurethane has also been used in biomedical, coatings, adhesives and composites. TPU is a material that is categorized under the thermoplastic elastomers. It can be recycled due its ability to reform if reheated.

In order to develop TPU/Kenaf new composite two main steps has been done. First, optimizing processing parameters, such as, temperature, speed and time were optimized. Second step was optimizing the fiber size. Bast fiber was extracted by mechanical decortication. Fiber was pulverized using a Fritsch Pulverisette mill. Pulverized fiber was sieved using an auto shaker sieve into three different sizes. TPU/Kenaf composite was compounded using a Haake Polydrive R600 internal mixer. Matrix was charged into the mixer until torque was stabilized, and then fiber was added into the mixer. A 30% fiber loading was fixed throughout the study. The sample was hot pressed using Vechno Vation 40 ton compression molding.

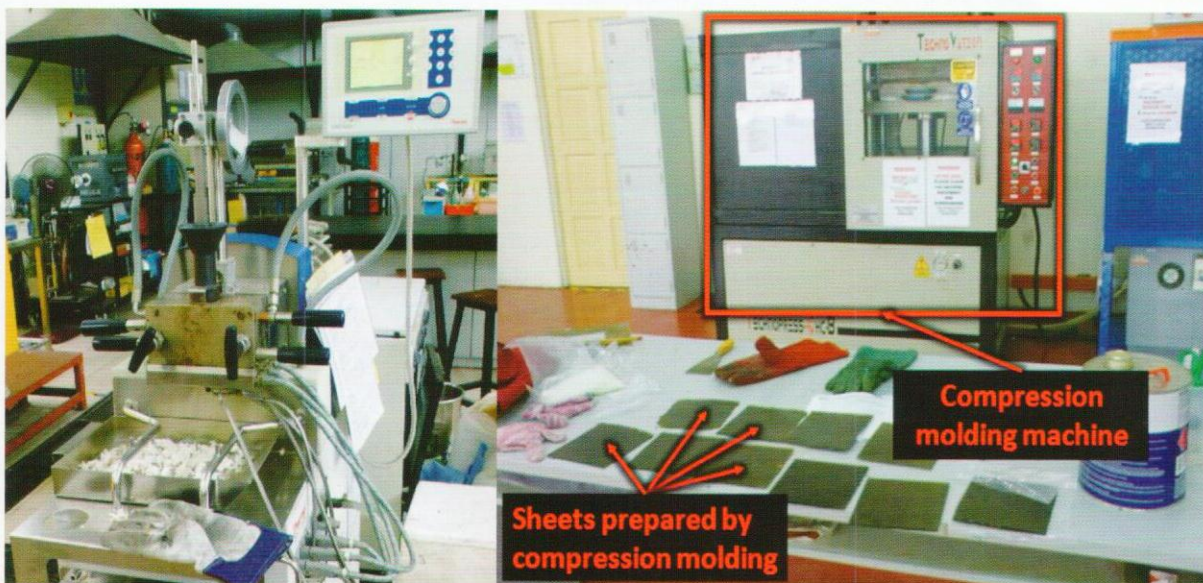
The development of a new TPU/KF composite was successful. Changing various processing parameters (i.e. temperature, time, and speed) showed significant changes in the tensile properties. Optimum values 190 °C, 11 min, and 40 rpm, of temperature, time and speed, respectively, were chosen based on the best tensile strength of 33.5 MPa. Different fiber size showed significant changes in the tensile and flexural properties

and impact strength. Fiber sizes in the range between 125 and 300 μm exhibited the best tensile and flexural strength and modulus. A larger fiber size showed only a slight increment of impact strength of about 7%. Therefore, a fiber size between 125 and 300 μm was considered to be the optimum size amongst the three size ranges examined.



Mill Used To Pulverize The Fibers

Auto Shaker Sieve



Internal Mixer

Compression Molding Machine

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THE PULP AND PAPER MILLS IN MALAYSIA

Ainun Zuriyati Mohamed @ Asa'ari, Phd

Currently, there are twenty pulp and paper mills in Malaysia, operating fifty machine lines. Nineteen of those mills use recycled papers as their main raw materials in paper production. The recycled papers are obtained from collection centres, which collect materials of various types, such as magazines, newspapers, writing papers, and carton boxes. Malaysia's one and only integrated pulp and paper mill, Sabah Forest Industries Sdn. Bhd. (SFI), in Sipitang, Sabah, East Malaysia, utilizes its own planted woody chips as raw materials. As reported by the Food and Agriculture Organization of the United Nations (2010), SFI acquires about 60,000 ha of industrial plantation area planted with fast-growing exotic plants, such as Acacia mangium, Eucalyptus camaldulensis, gmelina, and pine. Most of the mills are located in the Peninsular Malaysia in seven states: Kedah, Penang, Perak, Selangor, Pahang, Johor, and Melaka. Only three of the mills are situated in East Malaysia, including SFI.

Genting Sanyen Paper and Packaging Group (GSPP) was first established in 1992. GSPP is the main domestic player in the production of container boards. It is the largest integrated paper and packaging manufacturer in Malaysia equipped with two paper mills with an average capacity of 270,000 MT/annum and two box plants with an average capacity of 150,000 MT/annum. In 2010, GSPP operated as a subsidiary of Oji Paper Co. Ltd. (Asia's biggest and world's sixth largest pulp and paper company). Its products vary based on their basis grammage, 120-280 g/m², which include recycled test-liners (100% recycled fibres), corrugated medium papers, kraft-liners, white-liners, and corrugated carton boxes.

Malaysia Newsprint Industries Sdn. Bhd. (MNI) is located in the Temerloh Industrial Park, Mentakab, Pahang. The production capacity of the paper machine is about 250,000 MT/annum. MNI utilizes recycled old newspapers and magazines as raw materials, which are supplied by an efficient recycled paper collection centre. The role of MNI is to supply premium grade newsprints, locally.

Pascorp Paper Industries Berhad, which is located in Bentong, Pahang, was established in 1954/1980. Its main products are kraft-liner and corrugating medium paper made from recycled papers. The capacity of Pascorp Paper for a year is 200,000 MT whereby the production per annum is 150,000 MT.

Muda Paper Mills Sdn. Bhd. (Muda) consists of two branches: one in Tasek, Penang and another one in Kajang, Selangor. Muda pioneered paper milling in Malaysia, operating its first paper mill in Tasek, Penang in 1964. These mills manufacture high grade industrial brown papers, paper boards, and paper related products

either for domestic or export market. These mills used 400,000 MT/annum of waste papers, which are to be processed into recycled papers. Muda is facilitated by a water treatment plant in order to protect and conserve the environment. Its main paper products are core boards, liner boards, corrugated media, and test liners.

Nibong Tebal Paper Mill Sdn. Bhd. (NTPM) manufactures tissue paper products, such as toilet papers, facial tissues, napkins, paper towels, hand towels, kitchen towels, and other personal care paper products. NTPM operates since 1975 and has three sales branches situated in Malaysia, Singapore, and Thailand. It achieves an average production rate of 250 MT/day (about 100,000 MT/annum) with the help of eighteen paper-making machines.

CHH Pacific Papers (CHHPP) Sdn. Bhd., located in Bentong, Pahang is the first and latest Greenfield paper mill in Malaysia, contributing to a sustainable environment by recycling paper. Their main product is value-added packaging paper boards, namely Coated Duplex Board. It is a high quality board that has graphical uses for products such as foods, cosmetics, electronics, toiletries, sports wears, and consumer goods. CHHPP has been granted the Malaysia's Pioneer Status, complying the highest environmental and safety standards by applying the latest Korean paper making technology.

Cita Peuchoon Paper Mills Sdn. Bhd., located in Sg. Petani, Kedah, was established in 1976. The mill is equipped with four machines in order to produce joss papers, industrial core boards, and yellow wrapping papers solely from recycled papers. The total production output is 19,000 MT/annum. Currently, there are 83 technical workers and 14 capable administrative personals. Cita Peuchoon also does its part for the environment by utilizing state of art water recycling and waste water treatment technologies to ensure the effluent is not harmful to the environment.

Harta Packaging Industries Sdn. Bhd. (HPI) was first known as Harta Ngiak Sdn Bhd and established in 1987. In 1990, the name Harta Packaging Industries Sdn. Bhd. was used in order to reflect the change in its core business. The main products are corrugated boards, corrugated cartons, die-cut containers, and newly designed products, such as honey combs and paper pallets. Currently, it is one of the largest corrugated board and carton manufacturers in Malaysia with a production capacity of approximately 4,800 MT/month.

The pulp and paper industry in Malaysia is considered small, globally, in terms of the size and production

Capacity (below 300,000 MT/annum). Based on the Malaysia Pulp and Paper Manufacturers Association (MPPMA) in a report for the year 2009, five paper mills were producing less than 10,000 MT/annum, eight were producing 11,000-80,000 MT, and the remaining seven were producing 100,000 – 300,000 MT/annum.ity (below 300,000 MT/annum). Based on the Malaysia Pulp and Paper Manufacturers Association (MPPMA) in a report for the year 2009, five paper mills were producing less than 10,000 MT/annum, eight were producing 11,000-80,000 MT, and the remaining seven were producing 100,000 – 300,000 MT/annum.

Table a : Total capacity per annum paper manufacturers in Malaysia (2009)

| COMPANY | TOTAL CAPACITY PER ANNUM, 000 (MT) | PAPER TYPES | TOTAL PRODUCTION PER ANNUM, 000 (MT) |
|----------------------------|--|---|---|
| CHH Pacific Papers | 65.0 | | |
| Cita Peuchoon | 30.0 | Kraft/Corrugated Medium/Board & Joss | 24.0 |
| GS Paper | 300.0 | Kraft/Corrugated Medium/Board | 280.0 |
| Harta Paper | 30.0 | Kraft/Corrugated Medium/Board, Toilet/Facial Tissues & Joss | 23.0 |
| Johmewah Maju | 35.0 | Kraft/Corrugated Medium/Board | 8.0 |
| Kimberly-Clark | 45.0 | Toilet/Facial Tissues | 35.0 |
| Malaysia Newsprint | 260.0 | Newsprint | 250.0 |
| Muda Paper (Kajang) | 170.0 | Kraft/Corrugated Medium/Board | 160.0 |
| Muda Paper (Seberang Prai) | 180.0 | Kraft/Corrugated Medium/Board | 100.0 |
| Nibong Tebal | 150.0 | Toilet/Facial Tissues | 110.0 |
| Pascorp Paper | 200.0 | Kraft/Corrugated Medium/Board | 150.0 |
| Pembuatan Kertas (Perak) | 3.0 | Toilet/Facial Tissues & Joss | 3.0 |
| Sabah Forest | 165.0 | Writing/Printing | 165.0 |
| Taiping Paper | 2.4 | Toilet/Facial Tissues | 2.4 |
| Then Seng Paper | 15.0 | Kraft/Corrugated Medium/Board & Toilet/Facial Tissues | 11.5 |
| Union Paper | 12.4 | Toilet/Facial Tissues | 6.0 |
| United Paper Board | 80.0 | Kraft/Corrugated Medium/Board | 75.0 |
| Yeong Chaur Shing | 3.6 | Toilet/Facial Tissues | 3.6 |
| Others | 75.0 | | |
| Total | 1,821.4 | | |

Source : Malaysian Pulp and Paper Manufacturers Assosiation (2009)

CBD From The Perspective of Forestry Department of Peninsular Malaysia

By Norfaryanti Kamaruddin

The Convention on Biological Diversity (CBD), known informally as the Biodiversity Convention, is an international legally binding treaty. The Convention has three main goals; conservation of biological diversity (or biodiversity); sustainable use of its components; and fair and equitable sharing of benefits arising from genetic resources.

The Convention was opened for signature at the Earth Summit in Rio de Janeiro on 5 June 1992 and entered into force on 29 December 1993. To this date, 192 states and European Union are parties to the CBD. Malaysia has signed the treaty on 12 June 1992 and rectified on 24 June 1994. On 22 December 2010, the UN declared the period from 2011 to 2020 as the UN-Decade on Biodiversity.

There are two protocol which have been adopted by the Convention; Cartagena Protocol in 2000 and Nagoya Protocol in 2010. The Cartagena Protocol focuses on Biosafety. The protocol seeks to protect biological diversity from the potential risks posed by living modified organism (LMO) resulting from modern biotechnology. The protocol came into force on 11 September 2003. It establishes as advance informed agreement (AIA) procedure to ensuring that countries are provided with the information necessary to make informed decisions before agreeing to the import of such organisms into their territory – “a precautionary approach” as stipulated in Principle 15 of the Rio Declaration on Environment and Development. The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity is an international agreement, a supplementary agreement to the Convention. Aims at sharing the benefits arising from the utilization of genetic resources in a fair and equitable way, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding, thereby contributing to the conservation of biological diversity and the sustainable use of its components.

Some of the many issues dealt with under the convention include:

- Measures and incentives for the conservation and sustainable use of biological diversity.
- Regulated access to genetic resources and traditional knowledge, including Prior Informed Consent of the party providing resources.

Sharing, in a fair and equitable way, the results of research and development and the benefits arising from the commercial and other utilization of genetic resources with the Contracting Party providing such resources (governments and/or local communities that provided the traditional knowledge or biodiversity resources utilized).

Access to and transfer of technology, including biotechnology, to the governments and/or local communities that provided traditional knowledge and/or biodiversity resources.

Technical and scientific cooperation.

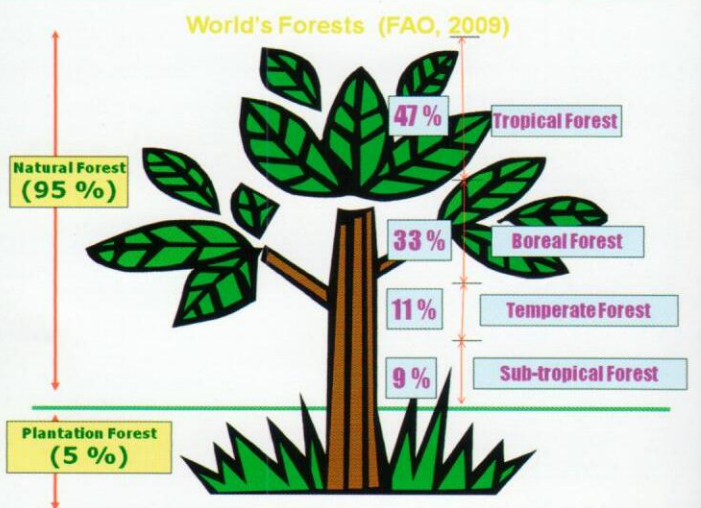
Impact assessment.

Education and public awareness.

Provision of financial resources.

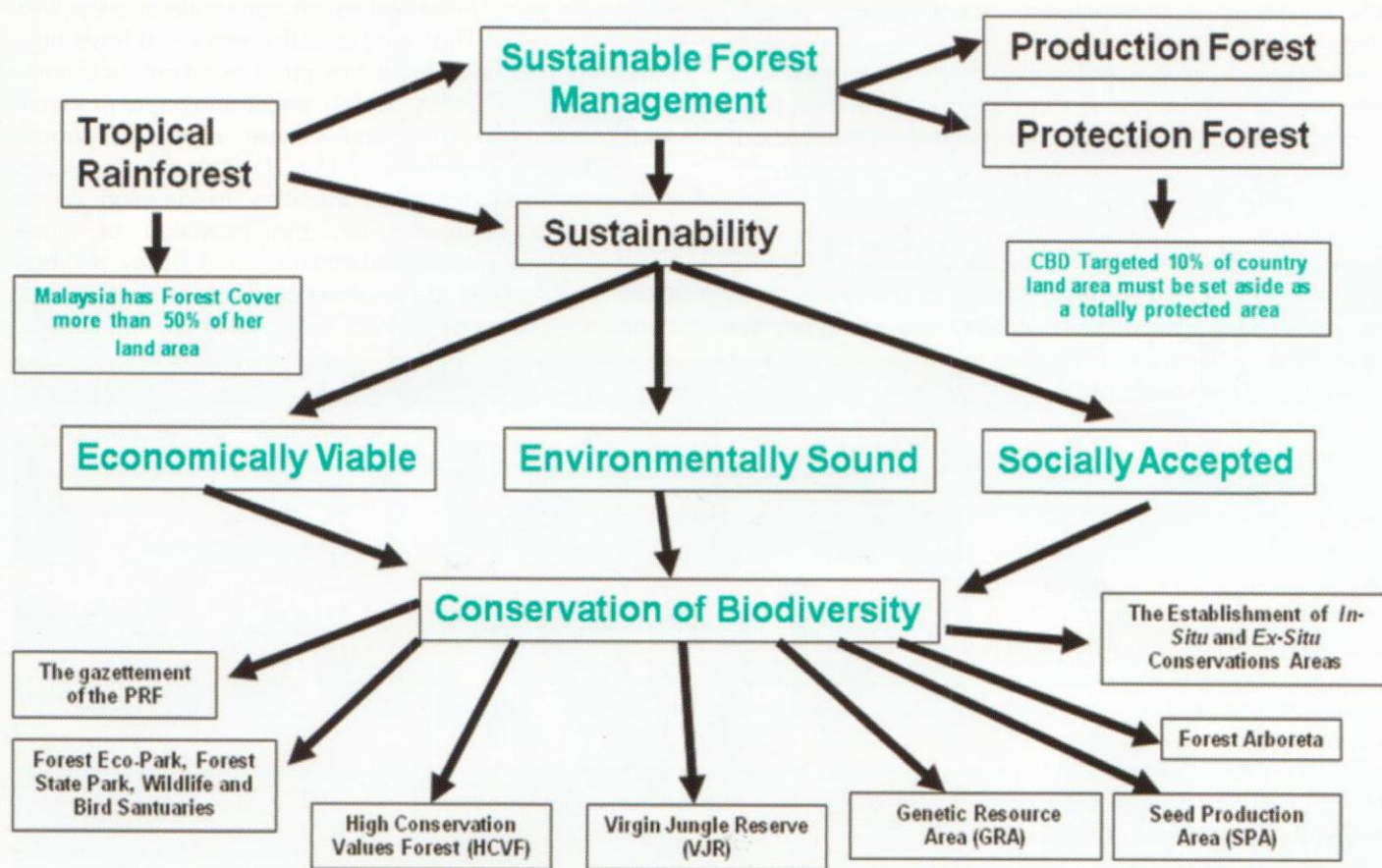
National reporting on efforts to implement treaty commitments.

As illustrated in below figure, tropical forest contributes 47 percent of the total natural forest coverage. Malaysia is one of the top 17 mega-diverse countries of the world. It has 56.4 percent of forest areas excluding forest plantation, oil palm, rubber, and cocoa and coconut plantation area.



In supporting to Cartagena and Nagoya protocol, Malaysia has implemented various policies to promote sustainable use of forest. National Forest Policy 1978 (Revised 1992) has two objectives; conserve and manage the nation's forest based on the principles of sustainable management; and Protect the environment as well as to conserve biological diversity, genetic resources, and to enhance research and education. Malaysia's National Policy on Bio-diversity, 1998 has six main trusts :-

- (i) To optimize economic benefits from sustainable utilization of the components of biological diversity,
- (ii) To ensure long-term food security for the nation,
- (iii) To maintain and improve environmental stability for proper functioning of ecological systems,
- (iv) To ensure preservation of the unique biological heritage of the nation for the benefit of present and future generation,
- (v) To enhance scientific and technological knowledge, and educational, social, cultural and aesthetic values of biological diversity; and
- (vi) To emphasize biosafety considerations in the development and application of biotechnology.



In the figure below illustrates the effort made by Forestry Department of Peninsular Malaysia (FDPM) to successfully implement SFM. The main target of SFM is to conserve the biodiversity. There are a lot of programs undertaken aligned with the conservation of biodiversity.

Although the concerted effort will continuously takes place, there are ways forward in conserving biodiversity in Malaysia. There is a crucial need in improving the scientific base information. Research institutions and universities are very much encouraged to get involved in providing basic science information on Malaysia's biodiversity. Furthermore, there should be more platforms in exchanging knowledge and information with foreign experts and scientists. Besides, there should be more enhancements

of sustainable utilization of forest bio-diversity through strengthening and integrating forest conservation program and establishment of sustainable forest management and conservation funding mechanisms. It also could be enhanced by integrating forest bio-diversity consideration into sectoral planning strategies as well as enhancing skill, capabilities and competency in the sustainable forest management and conservation activities. On the other hand, there should be some medium of encouragement for wider private sector participation in sustainable forest management and conservation activities/programs. The public and institution awareness must reach at higher level. Finally, there should be a stringent forest law and enforcement programs to successfully conserve the biodiversity in the long run.

Green Economic Conference

The 6th Annual Green Economics Conference: The Economics of Anthropocene
Norfaryanti Kamaruddin

The 6th Annual Green Economics Conference highlighted the implementing the economics of the anthropocene. The conference was held at the University of Oxford, the oldest university in the world. Green Economics Conference is the world's leading Conference in Green Economics. It was organized by The Green Economics Institute, United Kingdom. The institute's members are internationally renowned multidisciplinary scientists, economists, campaigners, Policy makers, Directors, Professors, Researchers from all over the globe. The conference was designed to present the important research and findings of economics by doing and also theoretical ideas about what reforms Green Economics can offer the mainstream and to allow time to think about the issues more fully.

Green Economics views the current economy downturn as a result of a clash between ecology and economy and argues that the commodity instability is a symptom the exhaustion of natural resources.

The markets are correctly reflecting that and are indicating that the traditional economics instruments and derivatives are however no longer relevant, and new methods of creating a natural economics need to be urgently developed. The world has changed and Green Economics is an economics which is comfortable with long termism – social equity and environmental justice act as a mantle.

There were fifty papers presented during the conference. The speakers were from all over the world – Malaysia, China, Singapore, Australia, South Africa, India, USA, United Kingdom and many others. Twelve themes involved in the conference; Climate Change and Carbon Economics, Energy Kyoto Protocol, COP Conferences, Life style changes – renewable energy, Women in Economy, Economics Methodology, Reform Economics, Green Economics in Government, Greening of Africa, The Green Economics Methodological Revolution, Biodiversity, and Green Economy Thinking.

I represented INTROP as a speaker as well as panellist during the Biodiversity and Environmental Justice session. The session discussed mainly on the problem of biodiversity loss resulted from deforestation and forest

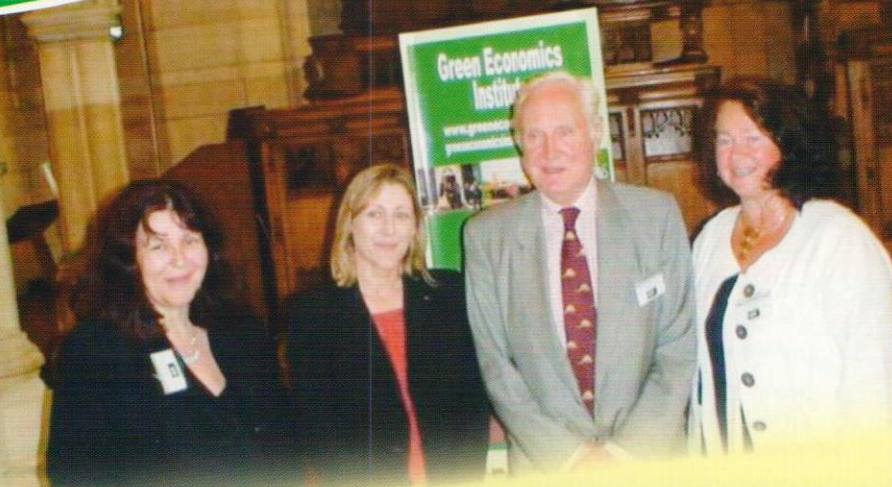
degradation. I represented Malaysia by explaining on the practices of Sustainable Forest Management by forest departments. Furthermore, I presented a paper title, "The Potential of Developing Green Business in Malaysia". It highlights the potential of utilizing alternative raw materials for wood based industry, for example, kenaf, oil palm fiber, bamboo and others. This is to encounter the declining supply of raw material which cannot keep pace with market demand. The wood based sectors that have high total output multiplier value are; other wood products comprise of bio composites (1.989), paper and paper products and furniture (1.970), and veneer sheets, plywood, laminated and particleboard (1.607). This results shows that there are more opportunities to develop green business in Malaysia with the provision of close collaboration between stakeholders and policy makers. On the last day of the conference, I sit for Professional Green Economist exam at Oxford University.



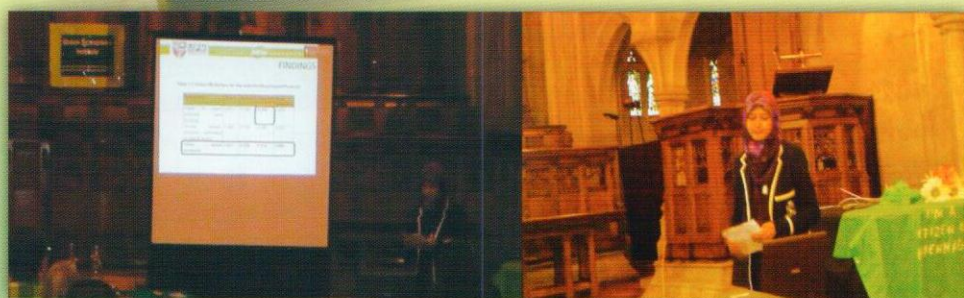
Group photo on the 28th July 2011, at Mansfield College, University of Oxford, United Kingdom.

Participants debated various issues involved in each themes covering all over the world. They were enthusiastic in changing the nation's economy landscape. The participants and institute's members accepted the idea of Green Economics which NOT just about the environment. It is about efficiency in economics. Reclaiming economics and provisioning for the needs of everyone and everything on the planet, other species, nature and its systems – the economics of sharing and unity. Hence, the in depth exploration on Green Economics methodology and efficient instruments are timely to activate. Green Economics is about living within our means, and paying for what we use as we go, NOT leaving the clean up for the next generations to sort out the mess!

Keynote Speaker of The 6th Annual Green Economics Conference – from left: Miriam Kennet (Founder / CEO of Green Economics Institute), Meredith Hunter (MLA (MP) Australia ACT Greens Parliamentary Leader), Sir Crispin Tickell (Director of the Policy Foresight Programme, James Martin Institute for Science and Civilization at Oxford University), and Ewa Larsson (Green MP in Sweden).



Sitting for Professional Green Economist Exam



Presenting "The Potential of Developing Green Business in Malaysia"



Panellists for Biodiversity and Environmental Justice session



Green Economics Model Workshop



A tradition in Oxford – Carnation giving Ceremony after the Final Exam

CORYBAS A HIGHLY ENDEMIC AND ENDANGERED ORCHID GENUS IN PENINSULAR MALAYSIA

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Corybas is an orchid genus that consists of about 131 known species in the world (The Plant List. 2010) but only eleven species were recorded in Peninsular Malaysia (Ridley, 1925; Holttum, 1964; Royen, 1983; Dransfield et. al., 1986; Seidenfaden & Wood, 1992; Turner, 1995; Schuiteman et. al., 2008), of which 8 species are endemic. There are 910 known species in 146 genera of orchid species in Peninsular Malaysia of which 198 (21.8%) are endemic (Rusea et al., 2010). The genus with one or more tiny tuberous one-leaved, single-flowered herb. In Peninsular Malaysia, they are terrestrial orchids that can only be found in the mossy forest with elevation of above 1000 meter above sea level (a. s. l.) in montane forest or ever-humid and wet limestone outcrops.

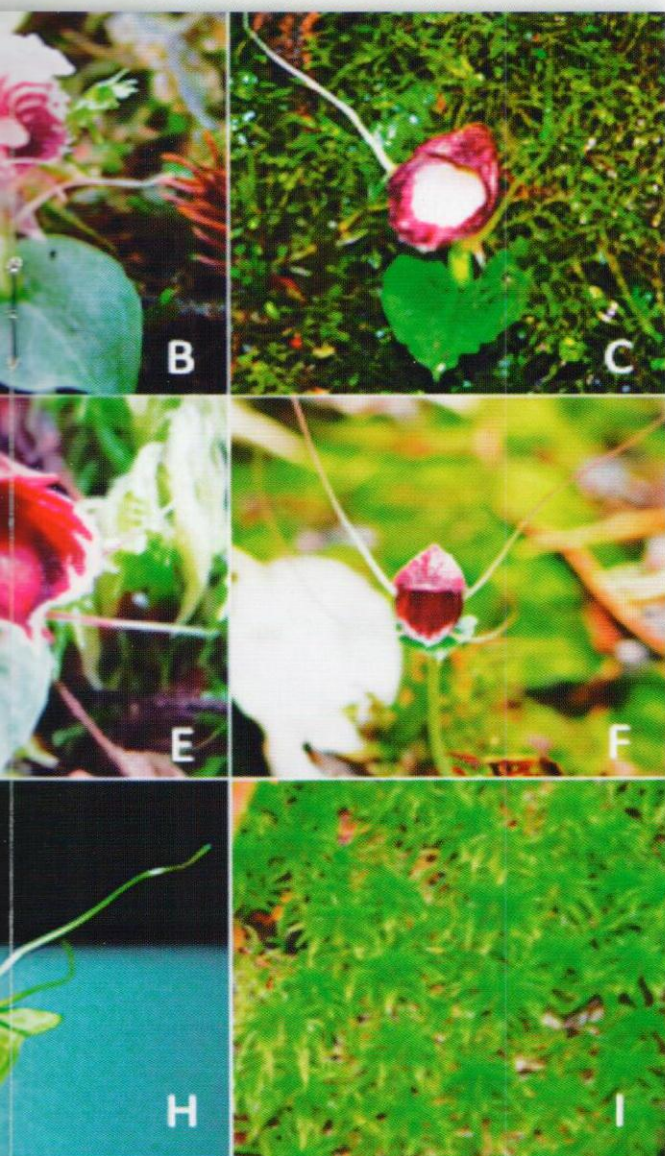
Corybas fascinating colour and special morphology has contributed to its common name known as "spider orchid" or "helmet orchid" based on its floral structures. It has a slender stem, bears a single flower just above of its single small heart-shaped (cordate) leaf with pale green, white or red veins. It is a very small plant of a few centimeters in height. Among the three sepals, dorsal sepal is large and erect from the base with broad hooded apex. Comparatively, lateral sepals and petals are narrow and thread-like, which sometimes longer than the size of the whole flower and spread like whiskers. Lip is erect from a tubular base with two short spurs. As noted by Holttum (1964), the pedicel of Corybas is very short during flowering, but elongates very much in fruit, which give the seeds a better chance of dispersal.



Figure 1. The eight species of Corybas. A. *Corybas calopeplos*; B. *Corybas carinatus*; C. *Corybas holttumii*; D. *Corybas ridleyanus*; E. *Corybas holttumii*; F. *Corybas ridleyanus*; G. *Corybas holttumii*; H. *Corybas ridleyanus* in mosses carpeted forest floor.



Figure 2. *Corybas* habitat, Genting Highlands (above) and Cameron Highlands (below).



Corybas recovered during this study.
 B. *C. Corybascomptus*; D. *C. Corybas geminigibbus*; E. *C. Corybas selangorensis*; H. *C. Corybas villosus* and I. *C. Corybas* for favourable for their growth.

Genus *Corybas* prefer a cooler climate like in highlands and mountains to provide a suitable habitat and environment for their growth. In Peninsular Malaysia, montane forests are the forest vegetation, which endows the flourish of *Corybas* spp. with cool and humid breeze from the atmosphere, and high accumulation of moisture by epiphytic bryophytes, moss-covered tree limbs and the thick forest floor litter. Most of the species are growing on mossy banks, mountain rocks or ridges-tops in montane forests. Some of the species like *C. ridleyanus*, *C. holttumii* and *C. villosus*, often grows among *Sphagnum* carpets which is believed to assist in their propagation and growth.

Highlands regions in Peninsular Malaysia are mostly concentrated on the main range, the Titiwangsa Range. It gives to the formation of the montane forest at the spinal cord of Peninsular Malaysia. Undoubtedly, today climate change and human activities have affected the habitat of many organisms, especially to the highland species. Genting Highlands and Cameron Highlands are two major highland habitat in Peninsular Malaysia that has been greatly fragmented and developed into popular eco-tourism hotspot in South East Asia. The natural environment and its general ecology has been seriously altered, including the orchid species population where species that are sensitive to drastic environmental changes would be threatened to extinction due to their inability to adapt accordingly.

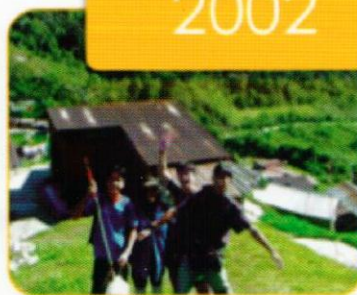
According to Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), all *Corybas* species in Peninsular Malaysia are under CITES Appendix II since 2003 (CITES, 2009). Undeniably, *Corybas* species deserve due attention and conservation effort as their loss could domino effect on other precious organisms within the ecosystem. They are potentially considered as the "panda" in the orchid's world. WWF-Malaysia (2010) reported that "our Main Range is not as cool as it once was" and the massive forest clearing is believed to be the main culprit. Genting Highlands and Cameron Highlands are the two major area



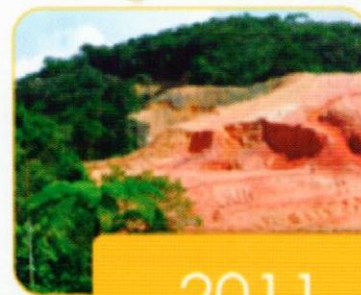
2009



1999



2002



2011

Highlands (below) showing the degraded montane forest in Peninsular Malaysia over a period of time.

threatened by the forest clearance activities with the evidence of temperature increased recorded in that area. Consequently, natural habitat of orchids is undoubtedly destructed. Forests and species are physically and genetically fragmented by logging activities (Dixon et al., 2003), which caused population decreased and gene pool weakening. Malaysian total known species, distribution, habitat preferences and conservation status are listed in Table 2 and (Figure 1) shows some species photographed in-situ. Two major threats faced by all the montane plant species in the tropical countries are local climatic changes and conversion of forested area to other land use. Through our observations over the years, all *Corybas* species are found going among mosses especially *Sphagnum* and some leafy liverworts. Mosses carpeted forest floor in the montane region are seen depleting drastically in all the above 1000m mountain peaks in Peninsular Malaysia. The best examples are Gunung Ulu Kali, Genting Highlands and Pine Tree Hill, Fraser's Hills, both on the Titiwangsa Range which is the back bone for Peninsular Malaysia. (Figure 2) shows the depleting mosses carpeted forest floor in both mountain peaks over a ten years period from 1999. Temperature raise and humidity fall are two key parameters that significantly impacting the survival of many mountain peak endemic species in Peninsular Malaysia (Ng et al., 2011.).

Corybas major weakness is their sensitiveness and slow adaptation to environmental changes even in their natural habitat. *Corybas* species are definitely unable to adapt quickly as other plants to the rapidly changing surroundings, proven by their small population in scattered patches in the forest. Being unable to adapt quickly makes conservation of their natural population is the only chance for them to survive, which could be accomplished through rehabilitation of their surrounding habitat. It is proposed that all *Corybas* species endemic to Peninsular Malaysia be categorized as Critically Endangered with criteria A1(c) (IUCN Red List 2001, Version 3.1) being met by all the 8 endemic species namely *Corybas calcicola*, *Corybas calopeplos*, *Corybas caudatus*, *Corybas holttumii*, *Corybas ridleyanus*, *Corybas selangorensis* and *Corybas villosus*. Further research on the ex situ conservation techniques for this elusive and sensitive ground orchid should be an immediate priority to safe guard their survival. However, in situ conservation remains the best conservation approach for biodiversity. Current global climate change also impacted major mountain regions in Peninsular Malaysia with evidence of thinning and declining area of mosses carpeted forest floor seen in Genting Highlands, Pahang where 5 *Corybas* species are recorded as well as Cameron Highlands where the hill has been cleared for residential (Figure 2).

Table 1. The total known species of *Corybas* found in Peninsular Malaysia with their distribution, habitat preferences and conservation status.

| Species | Distribution | | Habitat | Conservation Status in Peninsular Malaysia |
|---|-----------------------|------------------------------|-------------------------------------|--|
| | World | Peninsular Malaysia | | |
| <i>Corybas calcicola</i> J.Dransf. & G.Sm. # | Malaysia | Kelantan / Selangor / Pahang | Limestone Forest | Rare And Endemic To Three Localities |
| <i>Corybas calopeplos</i> J.Dransf. & G.Sm.*# | Malaysia | Kedah / Pahang | Mossy Montane Forest | Rare And Endemic To Two Localities |
| <i>Corybas carinatus</i> (J.J.Sm.) Schltr.* | Malaysia Indonesia | Perak / Pahang / Johore | Mossy Montane Forest | Widespread But In Small Populations |
| <i>Corybas caudatus</i> Holttum # | Malaysia | Pahang | Mossy Montane Forest | Very Rare And Endemic To One Locality |
| <i>Corybas comptus</i> J.Dransf. & G.Sm.*# | Malaysia | Pahang | Mossy Montane Forest | Rare And Endemic To Two Localities |
| <i>Corybas fornicatus</i> (Blume) Rchb.f. | Malaysia Indonesia | Pahang | Montane Forest | Rare And Only From One Locality |
| <i>Corybas geminigibbus</i> J.J.Sm.* | Malaysia Indonesia | Kedah | Mossy Thick Humus In Montane Forest | Abundant But Only Known From One Locality |
| <i>Corybas holttumii</i> J.Dransf. & G.Sm.*# | Malaysia | Pahang | Mossy Montane Forest | Rare And Endemic To Two Localities |
| <i>Corybas ridleyanus</i> Schltr.*# | Malaysia | Pahang | Mossy Upper Montane Forest | Rare And Endemic To Two Localities |
| <i>Corybas selangorensis</i> J.Dransf. & G.Sm.*# | Malaysia | Selangor / Pahang | Mossy Montane Forest | Rare And Endemic To Three Localities |
| <i>Corybas villosus</i> J.Dransf. & G.Sm.*# | Malaysia | Selangor | Mossy Upper Montane Forest | Rare And Endemic To One Locality |

Legend: * species recovered during this study
species endemic to Peninsular Malaysia

ACKNOWLEDGEMENT

The authors are grateful to many agencies and individuals. Their thanks goes to the Curators of herbaria especially Kew (K), Singapore (SING), University Malaya (KLU), Forest Research Institute Malaysia (KEP) and Universiti Kebangsaan Malaysia, Bangi (UKMB) for giving them permission to study their materials. This study was made possible with funds provided by Malaysian Government through Universiti Putra Malaysia Research University Grant Scheme (RUGS 05-04-08-0556RU) and Ministry of Higher Education Fundamental Research Grant Scheme (FRGS 07-11-08-606FR) of which the authors are thankful for.

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Position : Research Associate
Lab : Biorem

DEVELOPMENT OF HIGH PERFORMANCE OF SUGAR PALM (ARENGA PINNATA) FIBRE COMPOSITE VIA RESIN IMPREGNATION

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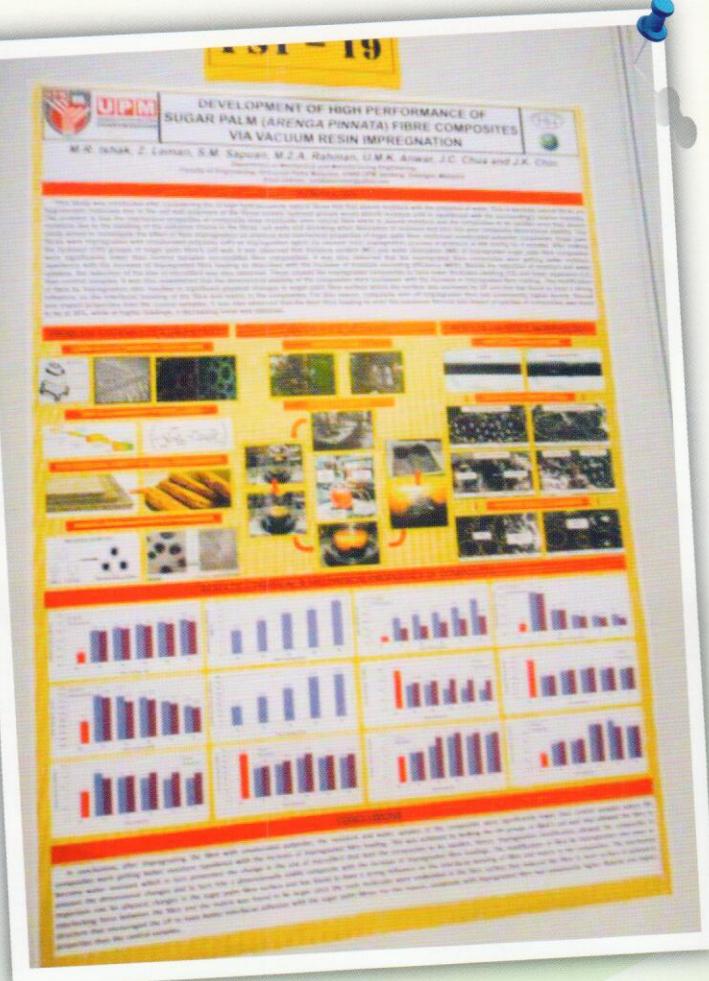
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This study was conducted after considering the of high hydroscopicity natural fibres that that absorb moisture with the presence of water. This is because natural fibres are hygroscopic materials due to the cell wall polymers of the fibres contain hydroxyl groups would absorb moisture until in equilibrium with the surrounding's relative humidity. The problem is that the mechanical properties of composite drop drastically once natural fibre starts to absorb moisture and the composites to be swollen once they absorb moisture due to the swelling of the cellulose chains in the fibres' cell walls and shrinking when desorption of moisture and turn into poor composite dimensional stability. This study aimed to investigate the effect of fibre impregnation on physical and mechanical properties of sugar palm fibre reinforced unsaturated polyester composites. Sugar palm fibres were impregnated with unsaturated polyester (UP) as impregnation agent via vacuum resin impregnation process at pressure of 600 mmHg for 5 minutes. After bulking the hydroxyl (OH) groups of sugar palm fibre's cell wall, it was observed that moisture content (MC) and water absorption (WA) of impregnated sugar palm fibre composites were significantly lower than control samples (unmodified fibre composites). It was also observed that the impregnated fibre composites were getting better moisture repellence with the increase of impregnated fibre loading as described with the increase of moisture excluding efficiency (MEE). Beside the reduction of moisture and water uptakes, the reduction of the size of microfibril was also observed. These caused the impregnated composites to have lower thickness swelling (TS) and linear expansion (LE) than control samples. It was also established that the dimensional stability of the composites were increased with the increase in impregnated fibre loading. The modification of fibre by impregnation also resulted in significant physical changes in sugar palm fibre surface where the surface was enclosed by UP and this has found to have a strong influence on the interfacial bonding of the fibre and matrix in the composites. For this reason, composite with UP-impregnated fibre had consistently higher tensile, flexural and impact properties than the control samples. It was also observed that the best fibre loading to yield the maximum flexural and impact properties of composites was found to be at 30%, while at higher loadings, a decreasing trend was obtained.



UNDERSTANDING SAFETY SIGNAGE

Everyone should have responsibilities and awareness about safety signage. It is important for people understand and comprehend the signage in their surroundings. Signs are used to prevent accidents and to inform on something that will bring risk to the people. It's very common used along the way side, at working area especially laboratory and in public building.

OSHA defines Safety Sign as "the warnings of hazard, temporarily or permanently affixed or placed, at locations where hazards exist."

BELOW ARE THE IMPORTANT SIGNS THAT YOU HAVE TO TAKE INTO ACCOUNT :

Danger signs must only be used where an immediate hazard exists. Their appearance is specified by OSHA. These signs are red, black (or contrasting colour), and white with room for words or symbols to describe the danger. Danger signs are common in areas where high voltages exist and where automatically-starting equipment is in use. You may be aware of other hazards which warrant the use of a danger sign.ity (below 300,000 MT/annum).



Warning signs are orange with black (or a contrasting colour) lettering or symbols. They are used to warn against hazards which aren't quite as serious as those requiring a danger sign-but are more serious than those requiring a caution sign. Warning signs may alert us to forklift traffic or similar hazards.



Caution signs must be used only to warn against potential hazards or to caution against unsafe work practices. Caution signs are predominately yellow with a black (or contrasting color) panel at the top of the sign. Caution signs warn of numerous hazards-everything from slippery floors to reminding us to wear safety glasses. Even traffic signals take a cue from the yellow caution sign as they warn us to be careful on the road. Special signs are used just for biological hazards and radiation hazards.



Safety instruction signs are used to provide information about safety. They are not used to warn against specific hazards. These green and white signs remind you to report accidents, help locate first-aid equipment, and direct you along an evacuation route.

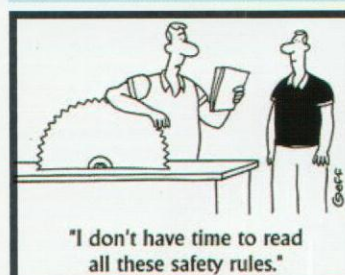
Though signs are never a substitute for good safety procedures and training, they are useful to remind us of hazards and ways we can protect against them. Always take seriously the information on a sign-whether in the workplace or on the road. Understanding signs and the hazards they warn us about can help prevent injuries and save lives.



The biological hazard (biohazard) sign is fluorescent orange or orange-red with letters or symbols in a contrasting color. The biohazard sign alerts us to the presence or potential presence of blood or other biological hazards.



Radiation hazards are identified with a sign bearing the familiar three-bladed radiation symbol in black or magenta or red on a yellow background.





Norfaryanti Kamaruddin has been awarded certificate of Full Professional Membership of The Green Economic Institute (MGEI) at the Green Economics Institute 6th Annual Green Economic Conference.





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Dr. Siti Khadijah Rambe Weber**Field of Specializations :**

Phylogeny, biosystematic and biogeography of ferns and lycophytes

Recent projects :

Phylogenetic analysis of the Aspleniaceae: an assessment of its taxonomy and distribution

What is your feeling when joining INTROP?

I have been working on taxonomy, phylogeny and biogeography of the Aspleniaceae since 1996. During that period I had the opportunity to collaborate and follow the methodological progress of different research teams working with ferns and lycophytes. This experience, together with the observation of many local samples, led me to the formulation of original questions namely on the

status of the cryptic species of *Asplenium nidus*. The offer of Post Doctoral Fellowship just came at the right moment with the opportunity to generate results that I believe will be a significant progress in this field of study. Most of the labs I collaborated with are situated in temperate regions. Having the chance to develop research on tropical species within the tropics is definitely exciting. Indeed, many tropical ferns have only been poorly studied. An example is *Asplenium nidus* that commonly represents the archetype of tropical ferns. This species was described by Linnaeus in 1753 using an incomplete specimen made of a juvenile with no rhizome. In consideration to the aptitude of ferns to form new species through hybridization, it is highly probable that *Asplenium nidus sensu lato* corresponds to multiple "cryptic" species that have not yet been properly differentiated. At INTROP all the facilities are here to pursue this work and maybe to establish new specimen types. The required samples are just growing splendidly on the trees around the UPM campus!

To get a comprehensive picture of the natural history, phylogenies need to be interpreted at the light of speciation processes, character evolutions and biogeography. Linking these different aspects to find out what happened in the past is precisely what makes this research one of the most interesting. Biological systematics represents a lot of fieldwork and observations. Sampling for

phylogenetic inferences needs to be done in concordance with geographical distributions and to include specimens with character distinctiveness able to witness evolution processes through the history. The outcome of this investigation is not less than writing a part of the history of life which is also a component of our cultural identity. At a given time, the pyramids of Egypt were just considered and used as a source of construction stones. It is the process of reconstruction of ancient civilization histories that gave them their current value. For the same reason, I am convinced that biological systematics is the place to start if we want to find new forms of values for our natural heritage. INTROP's culture and vision of linking upstream and downstream research is particularly favorable to this approach that not only permits to answer existing questions but also to propose whole new concepts.

What is your strategy for the future as Post-Doc in INTROP?

Publication is the essential short term objective. It is the only way to give a visibility to our activity. I also believe that writing is a more that just advertising it is also a full part of the scientific thinking process, it helps us to sharpen the concept of our future projects. I have also some material from my PhD thesis that waits to be published in journals. In this regards, I would like to divide the one year contract of my current PostDoc into two with a main emphasis on publication during a first period and the development of a sound research plan associated to a proposal for funding during the second one.

What is your opinion of INTROP's working environment?

INTROP provides good facilities: quiet writing stations, a fully equipped lab for molecular analyses and the possibility to keep plant samples at the greenhouse. I also observed a politic that encourages local and international collaboration. Being located close to urban centers and nature reserves I would say that INTROP's working environment is not far from the ideal in my field of research.

How do you see INTROP 5 years onwards?

INTROP became a leading institute in fiber products by developing a culture that combines upstream and downstream research. In my eyes this expertise in fiber product is one of the possible innovations in the domain of sustainable environmental resources. I believe that with maintaining the same culture of linking fundamental and applied research, the institute will be able to develop authentic innovations in other domains of sustainable environmental resources especially those linking biodiversity and tourism for which Malaysia has real natural advantages.



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Dr. Nasima Junejo**Field of Specializations :**

Soil Science, fertilizers and fertility

Achievements :

From 2004 – present, I am working with fertilizers. I have completed my M.Sc. from Pakistan in the field of agriculture soil science and joined Agriculture research department as a scientific officer. Later on, I got merit scholarship for PhD from Asian Development Bank and came to Malaysia in 2007. While my PhD in UPM, I produced a commercially acceptable coated urea fertilizer and published eight research article, two book chapters and one technical article in

internationally recognized journal and magazine. While waiting for Senate decision, I got a chance to work for UPM holding and worked as UPM honorary consultant. At present, I am member of Soil science society of America, Australia, Pakistan and Canada. As an oral participant, I attended international conferences in Pakistan, Malaysia, Thailand and New Zealand.

Recent projects :

Recently, I am working on the effects of organic and inorganic fertilizers and soil activator on the production of kenaf grown on BRIS soils of Malaysia.

What is your feeling when joining INTROP?

UPM is the best university in Asia and I got an opportunity to get my PhD degree from here like an honor for me. When I joined as a researcher INTROP. It was an unknown zone for me. I was confused about the new atmosphere and staff but, I found here every one quite friendly and helpful.

What is your strategy for the future as Post-Doc in INTROP?

My future goal as a Post doc is to enhance my resume by publishing, teaching, conducting research, and improving my skill as an international scientist.

What is your opinion of INTROP's working environment?

Here is an ideal working environment for a scientist. I enjoy working independently. My supervisor is friendly with great communication skills and could coach and lead me to meet common and rewarding goals. It is a place where I can grow not only professionally but intellectually

How does you see INTROP 5 years onwards?

In future, INTROP shall be a reference point for forest research and Products.



Email : smohieldin@gmail.com

Dr. Saifeldin Dalaalla Mohieldin Ali**Field of Specializations :**

Major: Forestry. Specific: Pulp and Paper Chemistry and Technology

Achievements :

4 Scientific Papers, 4 Conference papers and posters.

Recent Project :

Effect of Kenaf Nanofibers on Strength and Other Properties of Paper

What is your feeling when joining INTROP?

I have great opportunity to upgrade my career. It is also great chance for me to deepen my knowledge

in my field of specification especially in nanotechnology in pulp and papermaking.

What is your strategy for the future as Post-Doc in INTROP?

I would like to have more contribution in achievement of the INTROP's objectives by suggesting more research projects teaming up with different INTROP staff. Furthermore, I would like to help in establishing and strengthening the collaboration between INTROP and similar institutes in Sudan (Especially the National Center for Research)

What is your opinion of INTROP's working environment?

The INTROP working environment is quite suitable where the staff members are dedicated and motivated, and most important they are friendly and encouraging. The labs. facilities are adequate although need some improvement.

How does you see INTROP 5 years onwards?

I would like to see INTROP as the top institute in UPM besides being the reference in its field for Malaysia and well recognized in the region.

INTROP STRATEGIC PLAN 2011

INTROP conducted the 2011 Strategic Plan Workshop in 2 phases:

1) 18-19 April 2011, Seminar Room, Golf Club, UPM

The objective of this workshop was to review the mission, vision and strategic plan for 3 years (2011-2013) to be in line with UPM strategic plan. This is to ensure that INTROP can contribute towards achieving the goals set by UPM for the year 2011-2013.

2) 8-9 August 2011, IOI Palm Garden

The main goal of the workshop was to evaluate the laboratories' achievements based on the targetted goals set through the first half year of 2011 and subsequently to set up the target for the second half of 2011.

PUBLIC LECTURE : An European Research Program on Forest Fire Behavior and Fire Safety

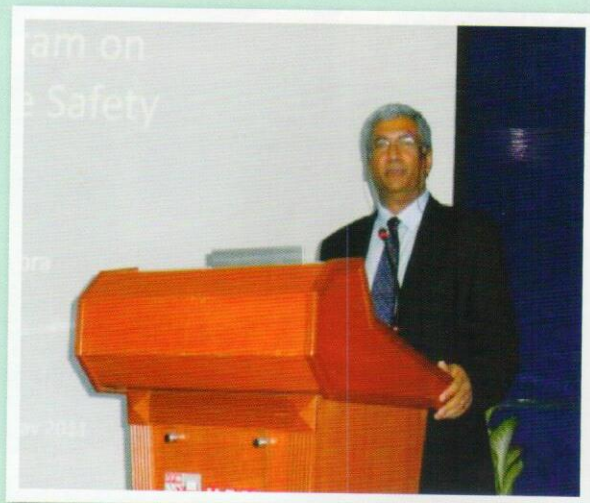
Date : 30 MAY 2011

Venue : Briefing Hall, Administration Buiding, UPM

A Public Lecture entitled "An European Research Program on Forest Fire Behavior and Fire Safety' was presented by the renowned Prof. Dr. Domingos Xavier Viegas. He was born on 24 August 1950 in Goa (India). He is a full Professor at the Mechanical Engineering Department of the Faculty of Science and Technology, University of Coimbra since 1991. He received his PhD in Mechanical Engineering (Aerodynamics) from University of Coimbra in 1982. Currently, he is the head of a research unit on forest fire at the University of Coimbra. In addition to that, he is also the Director of the Association for the Development of Industrial Aerodynamics (ADAI), Director of the Forest Fire Laboratory of ADAI, Coordinator of several research projects and contracts supported by National and European funds.

His main area of research interests are forest fire propagation, personnel safety and decision support for fire management. He is the author of a large number of publications and research studies, including 34 articles in peer reviewed international journals; he has been supervising a large number of Master and Doctoral Thesis. He has also been invited to give lectures on Forest Fires at several International Conference and other meetings.

In 2004, he and his team of ADAI received an award namely the EL batiefuegos de Ore Award — or golden fire swatter— for excellence in international technical cooperation given by the Association para la Promocion de Actividades Socioculturales (APAS) with the support of Spanish fire managers and stakeholder.



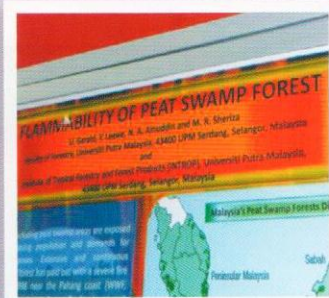
Courses on Forest Fire & GIS Modeling

Date : 30-31 MAY 2011

Venue: Laboratory of Photogrammetry, Faculty of Forestry, UPM

The speaker for this course was Prof. Dr. Mastura Mahmud from Faculty of Social Science and Humanities, Universiti Kebangsaan Malaysia. The second speaker was Mr. Ismail Adnan Abdul Malek from the Faculty of Forestry, Universiti Putra Malaysia. This course was also assisted by two facilitators namely, Mrs Sheriza Razali, a Research Officer in INTROP and Miss Nur Kyratul Syafinie Abdul Majid, a Master Student in Faculty of Forestry.

The course consisted of participants from various agencies such as the Forest Department of Peninsular Malaysia, Department of Meteorology, Malaysia, Faculty of Forestry and Faculty of Agriculture, UPM. This one and half day course covered various topics such as Brief Introduction to Forest Fire and GIS Modeling, Application of GIS and Remote Sensing in Forest Fire Risk Assessment and Hotspot Analysis in Forest Fire.



INTROP Safety And Health Workshop, 2011

Date : 27 JULY 2011

Venue : Meeting Room, INTROP TECH, UPM

This course was attended by staff and graduate students especially for new students. The main objective was to create awareness about safety in the workplace, especially when conducting research involving chemicals and machineries in the Lab. This course covers related topics such as Fire Prevention Awareness, Introduction, Rules and Regulation of Laboratory and Laboratory Book Usage Guideline.



AMIC Visit To INTROP, UPM

Date : 21 SEPTEMBER 2011

Venue : Meeting Room, ITMA

Aerospace Malaysian Centre (AMIC) is part of the government initiatives in collaboration with the Malaysian Aerospace Council and MIGHT-Meteor Advanced Manufacturing Institute subsidiary of MIGHT to ensure aerospace industries in Malaysia sustain through R&D. On the 5th of April 2010, AMIC had appointed UPM as the leading university thus UPM is required to provide physical asset and infrastructure such as workshops, laboratories, and equipment to assist with the R&D.

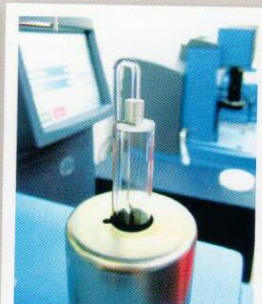
INTROP was selected as one of the institutes to provide those required from AMIC. Dr. Cyrille Schwob has represented AMIC to visit the facilities available in INTROP together with Dr. Roshdi Hassan, General Manager (R&D) of AMIC and several of their staff. Following that, they convened with INTROP's management team and further discussed on the collaboration.

JOINT-SEMINAR ON MATERIAL CHARACTERIZATION : New Concept of Particle Characterization

DATE : 30 SEPTEMBER 2011

Venue : Briefing Hall, Administration Building, UPM

The Joint-Seminar was organized by Institute of Tropical Forestry & Forest Products (INTROP) with collaboration of DKSH Technology Sdn. Bhd. and Malvern at Briefing Hall, Administration Building, Universiti Putra Malaysia. About 30 internal participants were successfully attend the joint-seminar. The main objective to have this collaboration is to introduce the alternative way on how to characterize the particle size, shape and chemical used by using the morphology G3 with Raman spectroscopy.



Training on Thermal Gravimetric Analyzer (TGA) And Differential Scanning Calorimeter (DSC) & Thermal Mechanical Analyzer (TMA)

DATE : 3 - 7 OCTOBER 2011, 19 - 20 OCTOBER 2011

Venue : INTROP TECH, UPM

INTROP has bought three (3) new equipments and these are the series from TA Instruments, USA, instead of Dynamic Mechanical Analyzer (DMA) that already bought on 2009. The training was attended consistently by 10 participants which involved staffs and postgraduate students from BIOCOSPOSITE. The main objective to pursue the trainings is to introduce the equipment as well as to demonstrate the dos and the don'ts while operating the equipment. Below are the type of analysis that can be analyze using the equipments :-

- i) TGA - Decomposition temperature, weight change, volatiles, composition, thermal stability
- ii) DSC - Heat flow (in/out), glass transition, crystallization, melting, curing, heat capacity, oxidation
- iii) TMA - Coefficient of thermal expansion (CTE), glass transition



COURSE ON ECONOMIC VALUATION : Revealed Preference and Constructed Market Approaches with Hands-on Computing

DATE : 6 - 8 OCTOBER 2011

Venue : Equatorial Hotel, Cameron Highlands

Estimation to the short and long term benefits and costs of nature conservation and environment protection was the main reason. Laboratory of Techno Economic and Policy has organized a Course on Economic Valuation: Revealed Preference and Constructed Market Approaches with Hands-on Computing from 6-8th October 2011. Ideal place like Cameron Highlands was chosen based on the needs of field survey of local and international visitors at recreational sites.

The main objective of this course was to promote Economic Valuation practices in Resources Management and Conservation of Environment. This course also covered theoretical basis of Economic Valuation and the estimation of economic valuation models. Besides, it covered incorporation economic valuation of the environment into land use decision making.

The 3-day course was attended by nine (9) participants from Universiti Malaysia Terengganu (UMT), Sabah Park, Forestry Department of Peninsular Malaysia and Universiti Putra Malaysia (UPM) itself. In this course, the participants were trained on framing their own survey questionnaire and try to get as much as possible the visitors to fulfill the data entry and analysis. At the end of this course, the speaker had proposed an advance course to be held at Pulau Perhentian or Sabah early 2012.



Seminar "Talk on Writing & Published in Indexed Journal"

Date : 16 NOVEMBER 2011

Venue : Gallery 2, Faculty of Engineering, UPM

This program is an annual program for INTROP's Post graduate students; aimed to improve and to enhance their knowledge in publishing high impact journal. A number of 20 participants took part in this program which consists of students, Post Doctoral, Research Officers and Science officers. The speaker of this talk is Professor Dr. Luqman Chuah Abdullah who is the Head of Laboratory of Biopolymer and Derivatives.

This talk is divided to two sessions where the first session placed emphasis on encouragement and motivated the participants to succeed in life. The second session is to enlighten participants on writing and to publish research articles. At the end of program, the participants were well-informed about publishing journal.



Date : 1 DECEMBER 2011

Venue : INTROP INFOPORT, UPM

The main objective of this activity was to provide additional training for staffs and post graduate students where it enabled them to become more familiar with the use of the building's fire safety system. It was also to determine whether the ERT Team established can competently respond in accordance with the emergency fire and evacuation procedures.

This activity has received support from 30 participants including staff and post graduate students who were at INTROP INFOPORT during that time. From the Post Mortem analysis, INTROP was informed by Observation Team (UPM Security Division) that this activity was successfully conducted and in compliance with all procedures and fire regulations.

Introp's Fire Drill

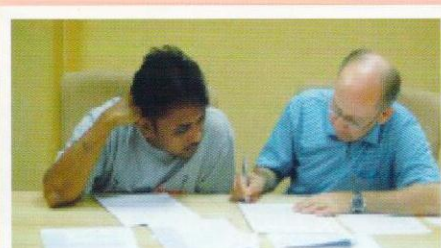


Technical Writing Workshop With Prof. Salim Hizroglu

Date : 1 - 5 DECEMBER 2011

Venue : Meeting Room, INTROP TECH, UPM

Laboratory of Biocomposite Technology (BIOCOMPOSITE) has organized a Technical Journal Writing Workshop with Prof. Salim Hizroglu from Oklahoma State University, United State. With the concept of 'Author & Reviewer', this Workshop was attended by post doctoral, research officers and postgraduates students whereas the participants will bring over their in-progress paper(s) and get the comment(s) from Prof. Salim Hizroglu as a reviewer. At the end of the Workshop, the participants were satisfied with the workshop's contents and hope to have the same programme again in the future.



Activities 2011

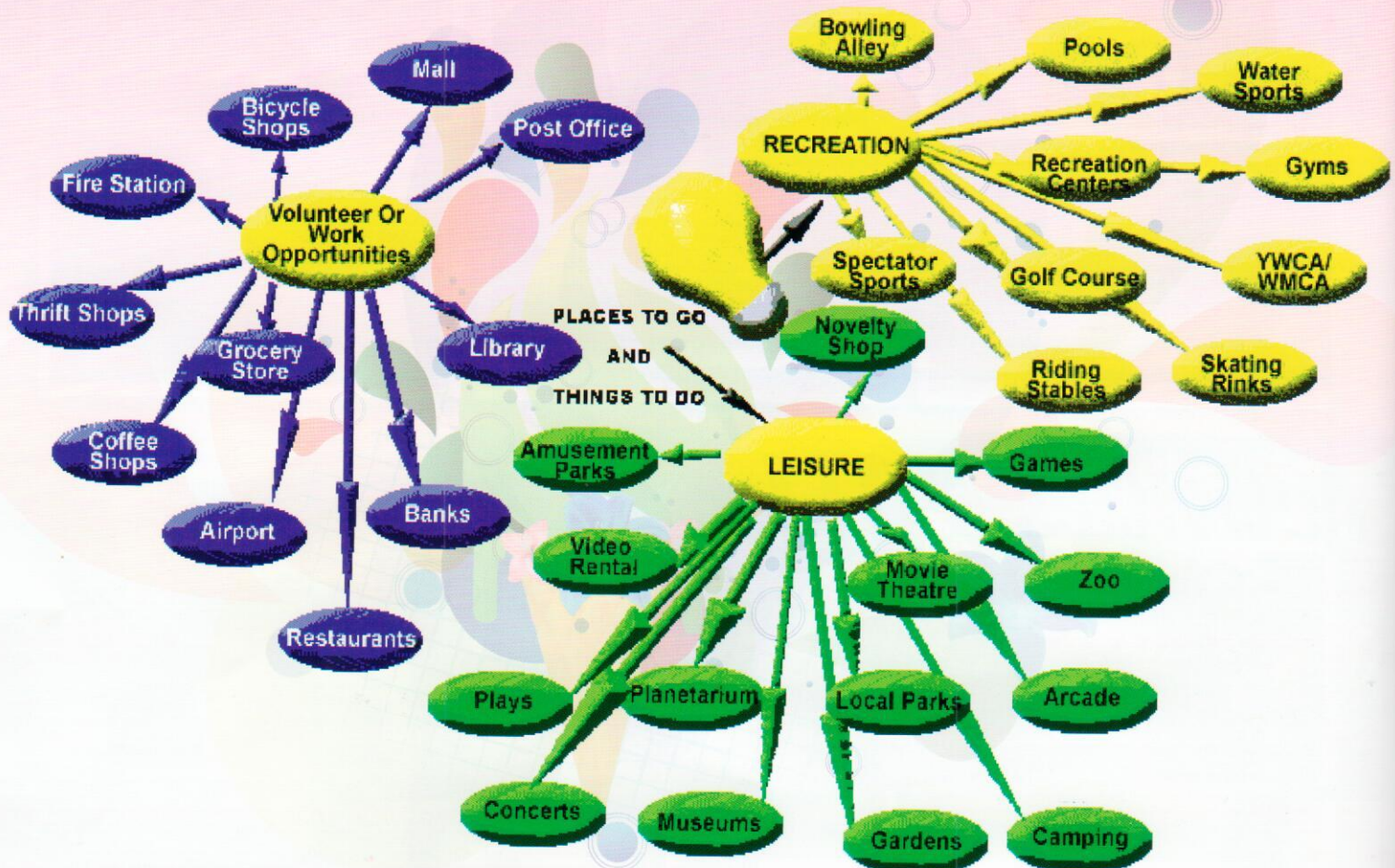




Brainstorming vs Brainwriting

WHAT IS BRAINSTORMING?

Whether it is an attempt to solve a problem or generating new ideas, for a group of people, the brainstorming technique is normally triggered by default. In actual fact, for some reasons, people around the world tend to choose brainstorming as their initial step for bigger things. Brainstorming is said to have its own fan base for idea generation tools and it has the same drill over and over again: to get as many people to assemble in a room and let their ideas thrown in while trying to build up on others'. In definition, brainstorming is a process for generating creative ideas and solutions through intensive and freewheeling group discussion in addition to verbal communication. When working in a group, brainstorming has its general rules to be applied; rules that are created to explain on how the tools would work for the group members. It highlights to users on how to reduce social inhibitions by focusing on quantity, withhold criticism, welcome unusual ideas as well as combining and improving ideas. The basic understanding within the group is to ask a specific question rather than multiple questions at one time and to encourage ideas rather than judgments.



THE SHORTCOMING OF BRAINSTORMING

Why is brainstorming so popular? It is simply because people believe that grouping people together is always more effective than letting a person work alone and in isolation. On a first look, it actually makes sense and in fact, it should be! The question is does brainstorming effectively generate ideas and prove to solve problems for us? The fact is that brainstorming; the way it is being carried out has some fundamental shortcomings. Here are some of the top reasons why brainstorming was not a preferred choice of tools and why it is not as effective as you think it is.

1. Blocking

By using brainstorming, we are allowed to speak our mind and throw all of our new ideas in the group but this are done with only one person being allowed to speak at a time. It is known that our brain's short-term memory cannot effectively develop new ideas while keeping old one in storage. If we cannot reveal our ideas because others are trying to give theirs, we will end up judging or editing current ideas being spoken, worst when we are forgetting them altogether in our mind. This what makes all the difference in our idea output, we may get only two or three comments before someone else breaks in with new ideas and the group has left the previous idea totally out of the scene.

2. Evaluation Apprehension

Some of you are familiar with this situation, where prior to a brainstorming session; someone will try to advise the group members to provide great ideas. This kick-start advice such as "Speak with no fear!" "Act as you are in a group", and many more may actually cause the ideas that should flow wild in the group become a little bit tame and could stay in the mind of some group members forever! They tend to think that their ideas will not be the same level as the others. This can happen due to the existing superiority within organization that belongs to a group of discussion. These individuals tend to say something like; "Maybe my idea is not that great and way off the mark".

3. Personality Face Off

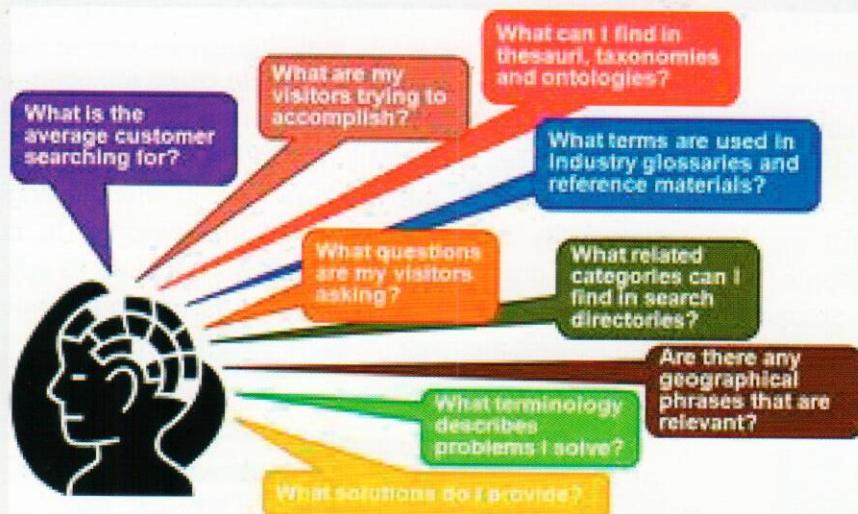
Believe it or not, brainstorming session can be compared to an arena of clashing human personalities. The session can be wasted with all sorts of unproductive behavior although it is true the session needs to have diversity in a way the ideas being treated. Previously, I have also stated that one of the main criteria for brainstorming to be effective is to reduce social inhibitions or in other words, we need to create a fair environment. For some reasons, people try to dominate sessions and passive people speak a minimum possibly to get away unnoticed. Determined members are getting overprotective of their ideas and tend to dismiss others'. Fearful or shy people being evasive and keep finding reasons not to get involved in the discussions and only, if being forced to, presenting safe ideas. The lists of people keep on going. The outcome of this personality differences can eventually do more harm than help to solve problems.

After seeing some of these so-called shortcomings, where it is a clear flaw in brainstorming, is working in a group still needed nowadays? How are we to create a no competition and equal chance for each group members? How are we going to create a more productive and enable the liberty of generating ideas?

INDIVIDUAL BRAINSTORMING

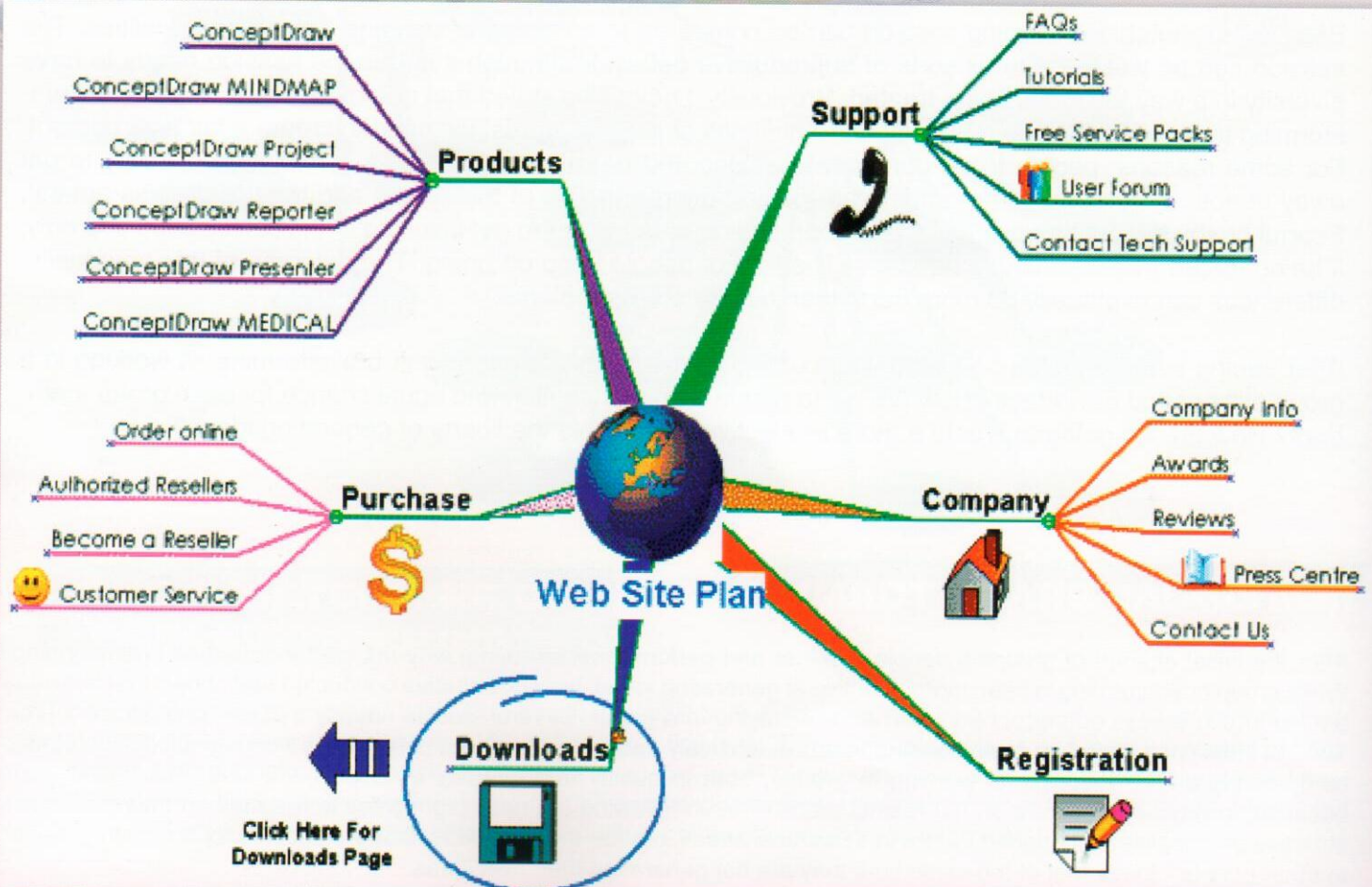
After the initial attempt of grouping people together and perform brainstorming, why not we try individual brainstorming? While group brainstorming is often more effective at generating ideas, previous studies conducted had shown that individual brainstorming always outperformed when we are staying in a group. Several studies notably by Diehl and Strobe's (from 1987 to 1994) has tested on brainstorming teams extensively and discovered that participants working in isolation consistently outperformed participants working in groups, both in quality and quantity of ideas generated. This might occur because, in groups, members do not restrict themselves in following the rules highlighted in the method thus the unconstructive personalities mentioned before in this article sneak into the group. Mostly, though, people pay so much attention to other people's ideas that at the same time they are not generating their own ideas.

Brainstorming on your own tends to produce a broad, wider range of ideas as compared to group brainstorming. This makes sense because you have something less to worry about when people's ego tries to get in the way whilst you are in a group of different personalities. Not only you can move freely and creatively, but you can also end up discovering something brilliant on your own and contribute towards the group because you have broadened the ideas when earlier on you might have slight hesitations to reveal. However, by doing this, unless you are on a par in terms of experience and knowledge with other members in the group, individual brainstorming can cause you dearly as the ideas pitched by you in the group following an unsuccessful individual effort that end up out of the whole topic or problems! You may not develop ideas as fully when you brainstorm individually as you do not have the experience of other members of a group helping you.



With all of this information, brainstorming in a group can restrict some members from verbally expressing their ideas. Individual brainstorming and further individually brainstormed ideas can result in some ideas that are not related due to lack of experience within some of the members in the group. How can we work in a group? And at the same time try to exclude the shortcomings whilst developing groups that are good in effective problem solving or ideas generating.

Time to meet the Brainwriting technique follow us in the next issue



12 July 2011

Visitor : **Prof. Dr. Alain Dufresne**
Pagora-Grenobel-INP,
Saint Martin d'Herès cedex, France

Expertise : Nanocellulose

Venue : Meeting Room,
 INTROP INFOPORT

20 October 2011

Visitor : **Mr. Adi Susmianto**
Mr. Agus Tampubolon
Mr. Endro Subiandono
Mr. Ika Heriansyah
Mr. Ibnu Sidratul Muntahar
Centre For Conservation and Rehabilitation
Research and Development,
Forest Research and Development Agency
(FORDA),

Research Fields : Conservation, Restoration, Rehabilitation and Reclamation

Venue : Meeting Room, INTROP INFOPORT
 Visit to Larut Matang, Perak

Objective : To Develop Joint Research Program in related field especially in the field of Sustainable Bioresources Management.

28 October 2011

Visitor : **Dr. Se-bin Kim / Dr. Joon-Woo Lee / Prof. Yong Joo Sung**
Dr. Seung-Mo Koo / Dr. Suh Jin Wee / Chungnam National University

Expertise : Forestry and Wood Biomass

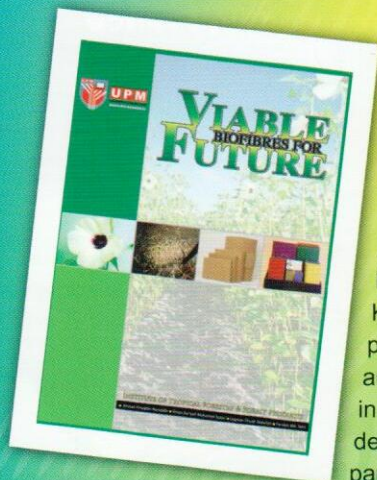
Venue : Meeting Room, INTROP INFOPORT

Objective : Visit to Laboratory of Biocomposite Technology, INTROP TECH
 To build strong relationship and collaboration especially in oil palm & biomass through a Memorandum of Understanding which had been signed on Jan 2010 between UPM & Chungnam National University (CNU). Both parties have discussed on how to implement activities mainly for joint research program and staff & student attachment which had been stated in the MOU.

Book 1 : VIABLE BIOFIBRES FOR FUTURE

Published : December 2011

Publisher : Jaybees Sdn Bhd



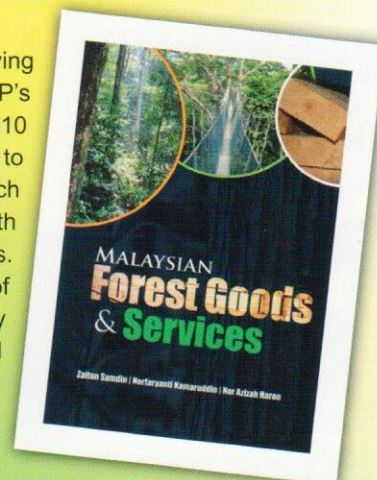
Summary : This inspiration to publish a book entitled Viable Biofibres is derived from the successful organized conference on International of Kenaf and Allied Fibres 2009 (ICKAF), held in The Legend Hotel, Kuala Lumpur. The conference provided a forum for discussion and facilitated the participants in exchanging ideas and latest development and findings, particularly on kenaf and allied fibres. There are twenty nine

papers were compiled and sectioned to six area that are Genetics and Biotechnology, Process and Engineering, Biocomposites: Study on Properties, Biocomposites: Applications, Pulp & Paper and Textiles, Economics and Environmental. This book is highly recommended to readers whom involved directly in using kenaf and allied fibres based on the six listed areas.

Book 2 : MALAYSIAN FOREST GOODS & SERVICES

Published : December 2011

Publisher : UPM Press



Summary : The idea of having this book came after INTROP's Research Colloquium 2010 ended. The aspiration is to compile and share research experience and findings with potential interested readers. This book is a compilation of research work done by INTROP's researchers and students whose work mainly focuses on the forest products as well as forest services. We believe

that this book is a useful reference for undergraduate and postgraduate students as well as researchers. This book is a compilation of studies in the field of forest goods and services. There are fourteen chapters in this book, including the introductory chapter. The chapters are grouped into three themes; timber application in architecture, forest goods and material properties, and forest services.

Book 3 : ECONOMIC VALUATION OF ORNAMENTAL PLANTS IN PENINSULAR MALAYSIA

Published : 2011

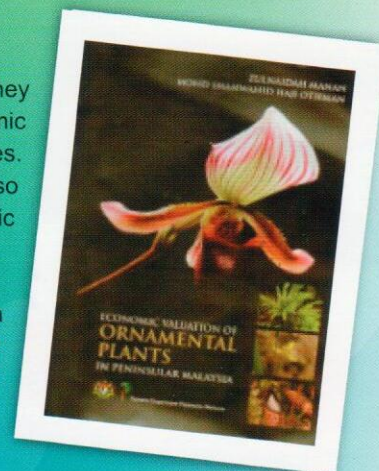
Publisher : Forestry Department Peninsular Malaysia

Summary : The natural forests are important and contain valuable assets to the country. They have contributed to the production of goods and services for the country's social and economic development. Forests are multi-functional and provide a complex array of goods and services. Besides producing goods and services that can be used to generate the economy, forest also provides ecological functions and services that directly and indirectly support or protect economic activities.

The study on the economic valuation of ornamental plants in Peninsular Malaysia is part of a development project entitled "Total Economic Valuation of Forest Goods & Services in Peninsular Malaysia" under the 9th Malaysia Plan undertaken by the Forest Economics Section, Forest Planning and Economics Division of the Forestry Department, Peninsular Malaysia. This study is conducted with the assistance of Universiti Putra of Malaysia (UPM).

This study attempts to measure the economic significance of the forest in relation to the production of wild ornamental plants from the forest, particularly in the state of Pahang. The purpose of economic valuation is to assign monetary value or shadow prices to forest goods and services apart from timber, that traditionally either do not have market transactions or only informal markets, such as wild ornamental plants. The information on cost and earning structure of an economic activity of wild ornamental plants is useful to producers, sellers, regulating agencies and economic planners. The cost and earning structure could help identify the major cost components of wild ornamental plant collecting. The collectors could use this information to raise the efficiency in the management of their business operations and identify constraining tasks and attempt to reduce their production costs.

The findings of the study on the economic valuation of ornamental plants are presented in this publication. They will provide general guidelines for the valuation of other forest goods and services, in the overall context of total economic valuation of the forest resources in Peninsular Malaysia.



| AWARD RECEIVED | RECIPIENT / RESEARCH TITLE | EXHIBITION NAME | VENUE | YEAR |
|----------------|----------------------------|-----------------|-------|------|
|----------------|----------------------------|-----------------|-------|------|

Gold Medal

AINUN ZURIYATI MOHAMED @ ASA'ARI
Water resistance paper made from Malaysian cultivated kenaf whole stem fibre

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Silver Medal

KHALINA ABDAN
High Moisture Durability of Moulded Biocomposit

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Silver Medal

KHALINA ABDAN
Kenaf nanofiber/Poly(lactic acid (PLA)
Nanocomposit

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Silver Medal

KHALINA ABDAN
Feasibility of biocomposite processing in
manufacturing industries

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Silver Medal

LUQMAN CHUAH ABDULLAH
Building Products Having Phase Change
Materials

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Silver Medal

EDI SYAMS ZAINUDIN
Potential of Pineapple Leaves Fibres as a
Substitute to glass Fibre in hybridized composite

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Silver Medal

NORFARYANTI KAMARUDDIN
Quantifying Farmers' Acceptance On Developing
Kenaf Industry In Malaysia

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Silver Medal

AINUN ZURIYATI MOHAMED @ ASA'ARI
Improvement of Old Corrugated Carton via
Mechanical Treatment (Kenaf Linerboard)

Malaysian Technology
Expo

Kuala Lumpur

2011

Bronze Medal

EDI SYAMS ZAINUDIN
Green Material for Industrial Building System

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Bronze Medal

LUQMAN CHUAH ABDULLAH
Modified biomass chemisorbent for dyes removal

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Bronze Medal

EDI SYAMS ZAINUDIN
Reduction Of Water Uptake Of Composite
Through Hybridization

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Bronze Medal

EDI SYAMS ZAINUDIN
Green Composite derived from Unplasticized
Polyvinyl Chlorid

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Bronze Medal

AINUN ZURIYATI MOHAMED @ ASA'ARI
Writing and printing grade paper from kenaf-EFB
mixed fibre

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Bronze Medal

SHERIZA MOHD RAZAL
Fuel Type Mapping Using Tasseled Cap
Transformation Technique

Invention, Research and
Innovation Exhibition
(PRPI)

UPM, Selangor

2011

Bronze Medal

**LUQMAN CHUAH ABDULLAH, MOHAMMAD
KHALID, CHANTARA THEVY RATNAM,
PARIDAH MD TAHIR**
A Novel Biofiller for Biocomposite Applications

Invention, Research and
Innovation Exhibition
(PRPI)

Kuala Lumpur

2011

Bronze Medal

LUQMAN CHUAH ABDULLAH
Modified Polyethylene Films as Packaging
Materials (Polyethylene Blow Film Modified with
Crude Palm Oil as packing Materials)

Malaysian Technology
Expo

Kuala Lumpur

2011

"Keep going and the chances are you will stumble on something, perhaps when you are least expecting it. I never heard of anyone stumbling on something sitting down."

-CHARLES KETTERING-

"Do not wait; the time will never be 'just right.' Start where you stand, and work with whatever tools you may have at your command, and better tools will be found as you go along."

-NAPOLEON HILL-

"Vision without action is merely a dream. Action without vision just passes the time. Vision with action can change the world."

-JOEL ARTHUR BARKER-

"You can't hit a home run unless you step up to the plate. You can't catch a fish unless you put your line in the water. You can't reach your goals if you don't try."

-KATHY SELIGMAN-

Q&A SECTION



The biome with warm temperatures and high rainfall is?

- a. Tropical rain forest
- b. Grasslands
- c. Temperate forest
- d. Desert

Answer : A) The biome with warm temperatures and high rainfall is the tropical rain forest. Deserts are warm but arid, and both grasslands and temperate forests have colder winter temperatures.



A primary abiotic limiting factor of a desert biome is?

- a. Lack of plant life
- b. Water
- c. Altitude
- d. Too much sand

Answer : B) Recall that limiting factors are environmental factors that affect an organism's ability to survive in its environment, such as food availability, predators, and temperature. A primary abiotic limiting factor of a desert biome is water.



Organisms inhabiting tropical rain forests might include?

- a. Monkeys and toucans
- b. Small trees and ravens
- c. Bears and tortoises
- d. Lichen and caribou

Answer : A) Tropical rain forests have warm temperatures, wet weather, and lush plant growth. Organisms inhabiting tropical rain forests might include monkeys and toucans.