

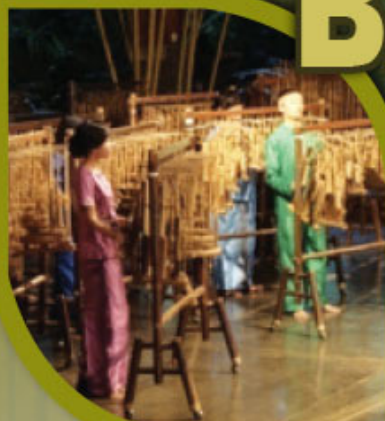
# INTROPica

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INSTITUTE OF TROPICAL FORESTRY AND FOREST PRODUCTS

Centre of R&D in Tropical Biocomposite and Forest Canopy Management

## BAMBOO WORLD



**PG3**

Highlight

**PG15**

Activities

**PG17**

Intropikedia

**PG19**

New Members





## Booming Bamboo Industry for Greener Environment and Economy

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Bamboos are the fastest growing woody plants in the world. There are over 1600 species of bamboo found in diverse climates from cold mountains to hot tropical regions. About 40 million hectares of the earth is covered with bamboo, mostly in Asia. The high growth rate of bamboo and the fact that bamboo can grow in such diverse climates makes the bamboo plant a sustainable and versatile resource.

Bamboo can be used as food, and shelter. Due to its ease of growth and extraordinary growth rate, have made it's a cheap, sustainable and efficient crop. Bamboo grows very densely and its clumping nature enables a lot of it to be grown in a comparatively small area, easing pressure on land use. Yields of bamboo of up to 60 tonnes per hectare greatly exceed the yield of 20 tonnes for most trees and only 1-2 tonnes per hectare for cotton with a one-time planting for bamboo and little care and maintenance needed. In a time when land use is under enormous pressure, bamboo's high yield per hectare becomes very significant.

Bamboo is classified under Non Timber Forest Products (NTFP). In many countries, such as Nepal, Bangladesh and India, it has been shown that the uses and extraction of NTFPs in general, are pronounced among impoverished class and declines as the household income increases. More so can be said of bamboo, as the influx of modern plastic and construction material are displacing bamboo from its historical uses. But as the modern market study shows, a new market is emerging in urban areas for handmade utilitarian and decorative objects. In housing sector, an interest is growing for low cost annexes, restaurants, weekend homes and even residential homes. In this burgeoning market, a transition for of traditional bamboo craftspeople to the modern bamboo sector can be relatively easy (and necessary), provided adequate organization, marketing skills, additional knowledgebase and proper policies are provided. Today, there are many actors in the bamboo sector, like small

scale producers, landowners, intermediaries, craftspeople, urban entrepreneurs and urban costumers, NGOs etc.

To promote the development of the bamboo industry, China has encouraged technological innovations. New processing techniques have led to a variety of new bamboo products, such as raw bamboo, daily-used goods, artifacts, plates, and bamboo charcoal, which are widely used in different sectors ranging from construction, packaging, transportation, medicine to tourism. A further opening up of the international market also helped to boost the industry. Health-care products and artificial plates made of bamboo were well received in Southeast Asia, Europe and America.

It is time our government and industries to call for the establishment of a high-tech industrial chain to enhance efficiencies within the bamboo sector with more encouragement for technology innovation and an optimization of the production structure. By developing the bamboo industry, it is of great significance to protecting the environment and developing a greener economy.



**Fig. 2.** World percentage of bamboo from different continents (Lobovikov et al., 2007)



plant fracture mechanism bamboo establishes itself as a superior natural fibre (Abdul Khalil et al., 2012). Now, it well established that bamboo is a composite materials of cellulosic fibres having tensile resistance of about 700 MPa (Sen and Reddy, 2011).

## Bamboo Fibre based Composites and its Applications

Bamboo fibre is a natural plant fibers with many of the advantages make attention of researchers to utilize it in polymer composites manufacturing. During the last few years, work has been done to replace synthetic fibers with bamboo fibres composites. Basically, large sized bamboo fibre like bamboo strips are manually aligned, fixed and set in a mould prior to pouring in a fluidic thermoset matrix (Liu et al., 2012). The composites are post-cured under a specified load to prepare thermoset composites. The matrices used most often are polyester, epoxy, and phenolic resin. Bamboo composites developed by various researchers, combining fibres with epoxy, polyester, and phenolic (Abdul Khalil et al., 2012; Liu et al., 2012). Bamboo fibres filled thermoplastic composites are also developed by using conventional petroleum based products, i.e., polyethylene, polyvinyl chloride, polypropylene, Polystyrene, and nylon. As compared to bamboo fibres/thermosetting composites,

bamboo fiber powder has been used to melt mix or co-extrude into thermoplastic composites (Liu et al., 2012). Bamboo based composites used in housing, furniture, packaging, transport etc. due to fast growing and renewability (Fig. 3-4). Day to day life several bamboo composites products available in the market. Recently published work reported on utilization of laminated bamboo lumber (LBL) in structural applications (Mahdavi et al., 2012). Its reported that bamboo composites can be used as beam, frame, joints etc in structural upgradation (Sen and Reddy, 2011). Bamboo composites also apply in water sports for manufacturing decks (Fig. 5). Recently bamboo based composites have been used in making a prototype by Mitsubishi Japan. Researcher underway to produce durable furniture, bicycle, tricycles, and car bodies by using bamboo composites.



**Fig. 3.** Garden furniture from bamboo fibre composites

Source: [www.composite-deck.com/bamboo-plastic-composite.html](http://www.composite-deck.com/bamboo-plastic-composite.html), Accessed on April 18, 2013

## Conclusions

Bamboo fibers has a relatively high strength, narrow microfibril angle, and low cost although it has the disadvantages of high moisture sensitivity and variation in fibres properties can be used effectively as reinforcement in fabrication of bamboo fibre based composites. Utilization of bamboo fibre with polymeric materials helps to develop cost effective and eco friendly bio composites which directly affect the socio-economic condition of farmers who are cultivating bamboo.





**Fig.4.** Furniture application of bamboo fibre based composites Source: [www.ipirti.gov.in](http://www.ipirti.gov.in), [www.bamboocomposites.com](http://www.bamboocomposites.com), Accessed on April 18, 2013.



**Fig. 5.** Water sports decks from bamboo fibre based composite source: [www.bamboosurfboardshawaii.com/surfboards.html](http://www.bamboosurfboardshawaii.com/surfboards.html), Accessed on April 18, 2012.

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## Research Fellow

Laboratory of Biocomposite and Technology  
Institute of Tropical Forestry and Forest Products (INTROP)





## ECOSYSTEM SERVICES AND VALUATION

The members of this research group consist of Professors and lecturers in the field of ecosystem services and valuation. One of the recent grants awarded is RM 1.1 million for five years. This project has a collaboration with other research universities (UKM and USM), and also international university (Taylor's University). In addition, the research work will collaborate with various stakeholders of natural resources in the country. Besides, the diverse researcher's age group makes this program lively and interesting, where two generations' ideas and experiences merge. Previously, this research group is under Ecosystem Services and Environmental Economic Valuation Laboratory (EcoserV), INTROP. Since August 2012 the laboratory is closed, hence these programs are currently placed under Bioresource and Management (BIOREM) Laboratory in INTROP.

The strength of this research group lies in its willingness to embrace integrated interdisciplinary research agendas that can tolerate new paradigms in solving problems and answering questions put forth by clients. There is also the potency and the determination of this group to move into new frontiers of research such as canopy level sciences and processes. The integrated investigation using "hard" and "socio-psychological" sciences promises a vast array of opportunities to better understand Global level changes locally in a more holistic manner.

The research has two main focuses. Firstly, is valuation of growing stocks and environmental services provided by bioresources and tropical rainforest ecosystem, both in physical and monetary units. It includes analysis on impact of developments on bioresources and forest

ecosystem. It also emphasizes on the policy study of sustainable forest management and wood industry. Secondly, the program focuses on ecotourism services and ecotourism resources. Ecotourism services include environmental interpretation, human-dimensions (social psychology), and user management. Ecotourism resources will include areas of canopy interpretation, utility of tropical rainforest flora and fauna, unique scenic features and functions. It is important to give attention to the fundamental and applied research efforts towards the understanding of the various eco-systems processes, which in the long run shall provide avenues for sustainable exploitation of the resources. These efforts can garner invaluable benefits through the wise and smart use of the limited resources of Mother Nature.







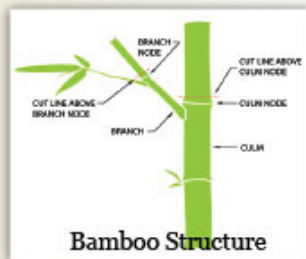
## BAMBOO! NOT JUST A NATURE



Bamboo is a monocotyledon plant in the grass family Poaceae. A young shoot of bamboo protected by a series of sheaths, which will fall off as the shoot grows into a mature culm. Most bamboos are hollow, where in the hollow inner area, some horizontal partitions called "diaphragms". On the outside, these partitions are denoted by a ring around the culm. A diaphragm and the ring on the outside together form a "node". Branches grow from these nodes. The part between two nodes is called an "internode".



Young Shoot



Bamboo Structure

Bamboo has the remarkable ability to create an "ambience", in the artistic sense of the term. The beautiful composition of leaves and culms, often in rich colors, has inspired poets and painters from the ancient to the modern times. In many modern shopping centers and office buildings around the world, bamboo's stately elegance makes it a cherished component of architectural design. But even in countries with cold climates – such as the Western European nations and the US – bamboo can be found in many gardens and parks as the bamboo lovers in these places seem to have developed an instinct for growing species that can survive cold winters.

Kingdom	: Plantae
Order	: Poales
Family	: Poaceae
Subfamily	: Bambusoideae
Supertribe	: Bambusodae
Tribe	: Bambuseae



Being the fastest growing plant on earth, due to the unique rhizome-dependent systems Bamboo is now identify as economic and cultural significance in South

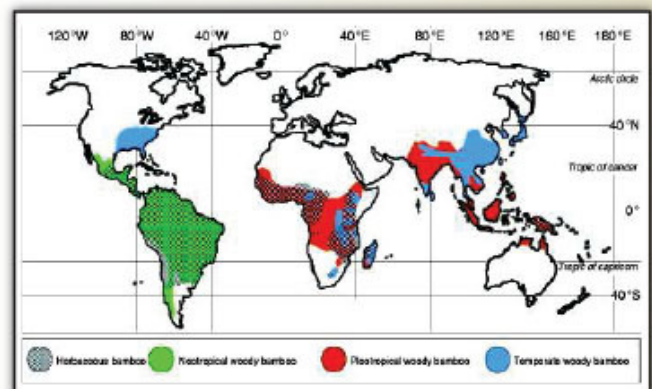
### An Appreciation:

**World Bamboo Day,  
September 18<sup>th</sup> 2012**



**Question:** "Why on earth would people want to celebrate a plant?"

**Answer:** Bamboo is a great plant. For one thing, it's highly versatile- a recent British Broadcasting Corporation article states that bamboo can be used in around 1 500 ways, from construction material and furniture to food and bicycles. No wonder people are calling it 'new super material', it's highly versatile.



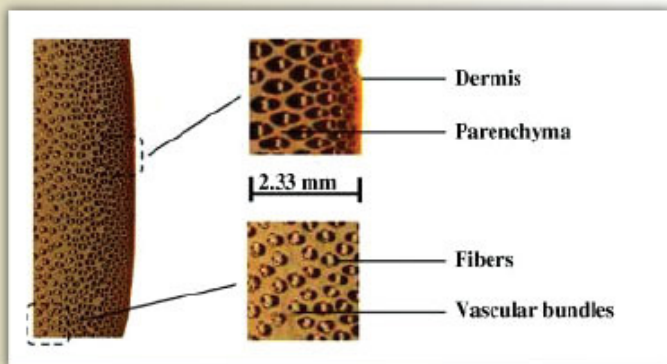
World distribution of woody (paleotropical, neotropical, temperate) and herbaceous bamboos (Source: Das et al., 2008)

Asia, Southeast Asia and East Asia. Bamboo has been proven to have greater strength, if not comparable, to that of timber. In Burma and Bangladesh, about 50% of the houses are made almost entirely of bamboo. In Java, woven bamboo mats and screens are commonly used in timber house frames. With modern polymer glues and bonding cements, bamboos are made into plywood, matboard and laminated beam.

### Structure of bamboo

The microstructure of culm wall can be seen Figure below. The outside of the culm wall (rightside of the picture) is dense, as can be seen from the dark color. This layer contains much silica, a good material to protect the plant, but a nuisance for tools as silica blunts their sharp edges within a short time. Approximately, a bamboo culm has 40% fibers, 10% vessels and 50% parenchyma.





A typical anatomical structure of bamboo

Mechanical properties of bamboo culms and timber species from different countries

Species	Country	SG	MC (%)	MOR (Nmm <sup>-2</sup> )	MOE (Nmm <sup>-2</sup> )
<i>Bambusa bambos</i>	India	0.65	15.5	67.4	6500
<i>B. blumeana</i>	Philippines	0.50	green	30.8	8640
<i>B. mutants</i>	Bangladesh	0.68	12.8	87.7	12900
<i>B. tilde</i>	India	0.71	14.9	50.6	8265
<i>B. vulgaris</i>	Indonesia	na	17.0	86.0	na
<i>B. balcooa</i>	Bangladesh	0.74	12.5	80.3	10900
<i>Dendrocalamus asper</i>	Indonesia	na	15.0	1,05	na
<i>D. strictus</i>	India	0.72	10.7	118.4	15949

Note: SG= Specific gravity; MC= Moisture content; MOR=Modulus of rupture; MOE=Modulus of elasticity; na = not available  
(Sources: Sattar, 1995; Anon, 2006; Anwar, 2008)

List of some bamboo species in Malaysia:

No	Species	Local Name	Note
1	<i>Bambusa blumeana</i>	Buluh Dur	Chopstick, tooth picks, furniture, musical instrument, poles, shoot as food
2	<i>Bambusa heterostachya</i>	Buluh galah/tilan/ pering	Poles, frames, tooth picks, blinds, skewer sticks
3	<i>Bambusa vulgaris</i>	Buluh minyak/aaa/ aro/gading/tamalang	Ornamental, tooth picks, chopsticks, skewer sticks, shoot as food
4	<i>Bambusa vulgaris var. striata</i>	Buluh gading	Ornamental
5	<i>Dendrocalamus asper</i>	Buluh betong/pering	Shoots as food, chopsticks
6	<i>Dendrocalamus pendulus</i>	Buluh akar/belalai	Handicraft, basket
7	<i>Gigantochloa 'Brang'</i>	Buluh brang	Shoots as food, chopsticks, skewer sticks, tooth picks
8	<i>Gigantochloa levis</i>	Buluh betong/bas	Shoots as food, chopsticks
9	<i>Gigantochloa ligulata</i>	Buluh tumpang/tikus belalai	Frames, shoots as food, poles for vegetable support
10	<i>Gigantochloa scortechinii</i>	Buluh semantan	Handicraft, small scale industries, incense sticks
11	<i>Gigantochloa wayi</i>	Buluh betiraga	Handicraft, small scale industries, incense sticks
12	<i>Schizostachyum brachycladum</i>	Buluh nipis/lemang	Handicraft, rice vessels (lemang)
13	<i>Schizostachyum grande</i>	Buluh semelang/semenyah	Frames, leaves used for wrapping Chinese glutinous rice dumpling
14	<i>Schizostachyum zollingeri</i>	Buluh dinding/kamp/ selen/ripas	Handicraft, tooth picks, skewer stick
15	<i>Bambusa arundinacea</i>	-	
16	<i>Bambusa buchaniana</i>	Buluh aloh bukit	
17	<i>Bambusa glaucescens</i>	Buluh pagar	
18	<i>Bambusa ventricosa</i>	-	
19	<i>Bambusa ridleyi</i>	Buluh akar	

## Bamboo Applications :

- **Bamboo shoots**- are edible and a major components of Asian dishes
- **Landscaping**
- **Chopstick, tooth pick**
- **Bamboo wine** - made from fermented juice of the wine bamboo (*Oxytenanthera braunii*) in Tanzania!
- **Bamboo canes** - use mainly for make cooking utensil, blow guns, toy & furniture
- **Wooden sword** called a "shinai" used in Japanese martial art Kendo normally made from strips of strong bamboo culms

- **Building materials**-large timber bamboo (e.g. *Dendrocalamus giganteus* & *Bambusa oldhamii*) –scaffolding, bridge-building, water pipe, storage vessels and houses
- **Music instruments** in most of Asian countries- e.g. shaku hachi (in Japan), made from the lower end of small-culmed bamboos, the Chinese xiao, a notche flute played in modern orchestras



Bamboo Shoot



Landscaping



Shinai



House From Bamboo



Bamboo Chair



Music Instruments

## INFO :

Tropical bamboos growing 100 feet in three months, an astonishing 0.0002 miles per hour!

Tasty Bamboo worms are edible for Thailand! Bamboo can be turn into fabric too!

It has great wicking properties & antimicrobial (that is can kill microorganisms like bacteria)

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By: Naszroul Haqimee Rahmat  
Science Officer, INTROP





## Bamboo Collection at the Arcamanik Forest Research Station, Bandung, Indonesia.

By : Ahmad Ainuddin Nuruddin (PhD)

### Introduction

Bamboo is a flowering perennial evergreen plants in Poaceae family. Bamboos are in the grass family, fast growing, having columnar stems which can be used as construction material. Indonesia has 157 species of bamboo which is 10% of the world total bamboo species. Sumatra has 76 species while java has 59 species. Indonesian government has allocated few research station for bamboo research and one of them is Forest Research Station Arcamanik, Bandung, Indonesia. It is part of the Indonesia's Forestry Research and Development Agency vast network of research stations.

### Location

Arcamanik Forest Research Station, Bandung, Indonesia with an area of approximately 17 ha is located in Desa Mekarmanik, Kecamatan Ujung Berung, Bandung District, West Jawa Province. It is located at 1350 m above sea level, an hour drive from Bandung. It is connected by partly asphalt and graveled road and can be accessed using a 4 WD vehicle.



Figure 1. Arcamanik Forest Research Station site is an hour drive from the City. City of Bandung is at the background.



Figure 2. Gravel road leading to the Arcamanik Forest Research Station site.

### Climate and Site Characteristics

Arcamanik Forest Research Station received an average of 2200 annual total rainfall and according to Schmidt and Ferguson (1951) climatic classification falls under type wet B with Q value of 32.5 %. The soils are mostly association of brown andosol with regosols originating from volcanic ash parent material.

Table 1. Rainfall and rainday at Forest Research Station Arcamanik, Bandung

No.	Month	Rainfall (mm)	Rainday (day)
1	January	355.1	19.4
2	February	292.4	19.0
3	March	295.9	14.0
4	April	299.7	14.6
5	May	113.6	8.4
6	June	84	5.3
7	July	190.1	4.9
8	August	47.0	2.7
9	September	74.4	5.4
10	October	151.3	9.6
11	November	247.1	12.6
12	December	304.4	15.4
Rainfall Annual		2597.9	131.29

One of the aims of this research station is to plant different species of bamboo available in Indonesia. A total of 24 Bamboo species are planted here starting from 1961 and the latest was 2007. The bamboos were planted along the trail and the visitors can view the bamboo from the trails within the research station. Even though many bamboos originated from Bogor, there are also others originated from different part of Indonesia.



This visit was beneficial and educating especially on different types of bamboos planted in the research station. The visit has allowed us to interact with FORDA's expert on bamboo and this will foster further collaboration on bamboo with INTROP scientists.



Figure 3. Researchers from FORDA involve in Bamboo research program in this Forest Research Station.

Table 2. Living collection of bamboo species at Arcamanik Forest Research Station, Bandung.

No.	Latin name	Local name	Year of plantin	Origin
1	<i>Arundinaria japonica</i>	bambu jepang	1991	Bogor
2	<i>Bambusa vulgaris</i> var <i>vitata</i>	bambu ampel hijau	1961	-
3	<i>B. vulgaris</i> var <i>striata</i>	bambu ampel kuning	1961	-
4	<i>B. arundinaceae</i>	bambu duri	1991	Bogor
5	<i>B. maculata</i> 1	bambu tutul 1	2007	Lampung
6	<i>B. maculata</i> 2	bambu tutul 2	1991	Bogor
7	<i>B. multiplex</i>	bambu pagar	1991	Bogor
8	<i>Dendrocalmus asper</i>	bambu bitung	1991	Bogor
9	<i>Gigantochloa atter</i>	bambu ater	1961	-
10	<i>G. apus</i>	bambu tali	1961	-
11	<i>G. atrovioacea</i>	bambu hitam	1961	-
12	<i>G. manggong</i>	bambu manggong	1991	Banyuwangi
13	<i>G. nigrocillata</i>	bambu lengka tali	1991	Bogor
14	<i>G. pseudoarundinacea</i>	bambu andong	1961	-
15	<i>G. pseudoarundinacea</i>	bambu temen	1961	-
16	<i>G. robusta</i>	bambu mayan	2007	Lampung
17	<i>G. levis</i>	bambu peting	1991	Banyuwangi
18	<i>Gigantochloa</i> sp	bambu batu	1991	Banyuwangi
19	<i>Phyllostachys aurea</i>	bambu cendani	1961	-
20	<i>P. pubescen</i>	bambu moso	2007	China
21	<i>Schizostachyum blumei</i>	bambu tamiang	1961	-
22	<i>S. brachycladum</i> var <i>hijo</i>	bambu leman hijau	1961	-
23	<i>S. brachycladum</i> var <i>kuning</i>	bambu leman kuning	1991	Bogor
24	<i>S. zollingeri</i>	bambu cakeutrek	1991	Bogor



Figure 4. INTROP entourage with FORDA researchers walking along the trail in the Forest Research Station



Figure 5. Bamboo species grown in Arcamanik Forest Research Station.





Figure 6. Black Bamboo species grown in Arcamanik Forest Research Station.

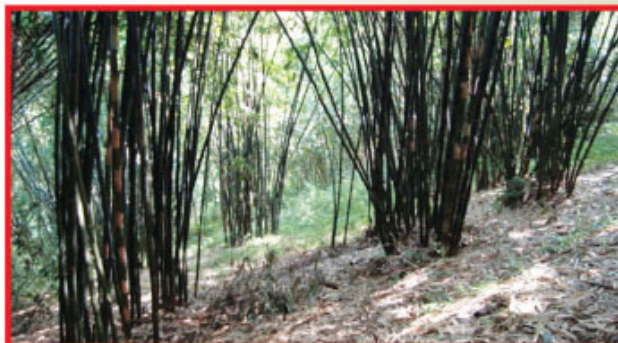


Figure 7. May culms of bamboo are planted in this research station.



Figure 8. FORDA's researchers explaining different types of bamboo available in this research station.



Figure 9. The yellow stripes on this bamboo species give beautiful appearance to the stems.



Figure 10. Angklung is an musical instruments made of bamboo.

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## A New Conversion Method of Bamboo Culm into Flat Sheet for Laminated Bamboo Board Manufacturing

Edi Suhaimi Bakar<sup>1,2</sup>, Zaidon Ashaari<sup>1</sup>, Mohd Zin Jusoh<sup>1</sup> and Mohd Dzafarin Sahrani<sup>1</sup>

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### 1. Introduction

The demand on wood has been uninterruptedly increasing over the time along with increase in the world population. On the other hand, wood supply, especially those from traditional forests, has been declined as a result of decrease in forest area and forest productivity. Efforts have been made in many parts of the world to produce more wood. These include programs such as promotion of tree plantation with fast growing species, promotion of community forest outside the forest area, and utilization of agricultural waste (rubber wood and oil palm wood from unproductive rubber and oil palm plantations). However, the total increase in the wood production cannot match the total increase in its demand. Therefore, many industries in wood sector cannot maintain their production (even some of them are closed down) due to insufficient supply of wood. This situation occurs in almost all parts of the world, including Malaysia.

### 2. Bamboo as Wood Alternative Material

Bamboo is a fast growing woody plant which can be harvested annually and is sustainable after its maturity (Wooldridge, 2012). It takes only about 3–5 years for bamboo to reach its full maturity as compared to 20–120 years of traditional hardwoods. Because of that, bamboo has gained a reputation as an eco-friendly and highly renewable source of material (Anon, 2012a, 2012b), and has been seen as good alternative material for wood. For this purpose, the most important part of bamboo is its culm, which is a woody material that has good properties and appearance. The culm consists of nodes, and hollow cylindrical internodes (Zhang et al., 2002; Anon, 2012c).

With its fast growth and high annual yield, bamboo plays a vital role in economic development, especially in the third world. Bamboo is notable for its economic and cultural significance in South Asia, South East Asia and East Asia. It is used for both traditional and modern uses. Traditionally, bamboo has been used to hold up simple suspension bridges, scaffolding, split and woven bamboo, and supplemental and/or decorative element in buildings (Anon, 2012c). In fact, it is valuable from top to rhizomes, with extensive uses in many fields (Yang et al., 2010). In Malaysia, 14 out of 59 species are commonly used by the Malaysian bamboo industry for making poultry cages, vegetable baskets, incense sticks and joss papers, skewers and chopsticks, woven blinds and handi-

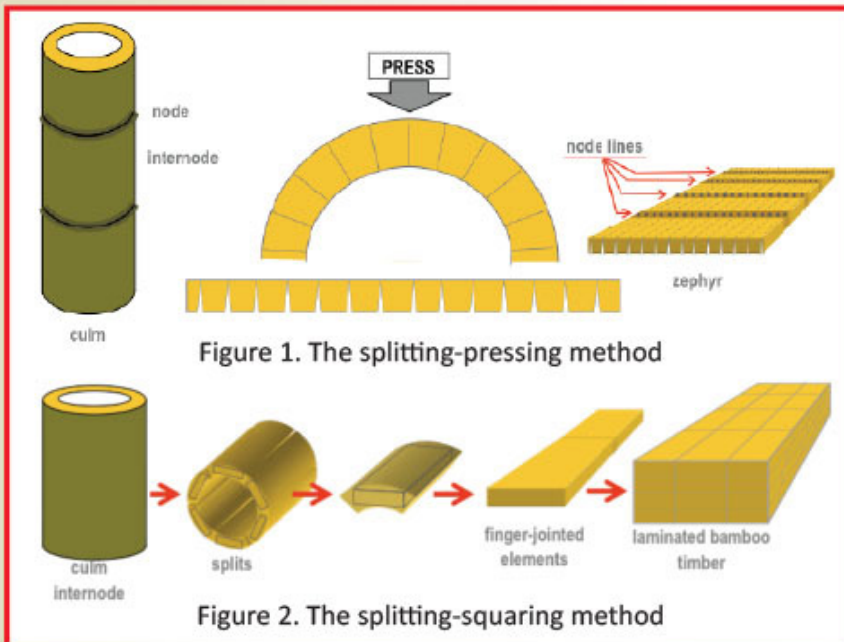
crafts (Azmy et al., 1994; Aminuddin, 1995). In modern uses, bamboos are converted into engineered products, such as laminated bamboo board, plybamboo, bamboo mat board, and bamboo curtain board to substitute the same material made from wood (Yang et al., 2010, Anwar, 2008).

### 3. The Processing of Bamboo

The processing techniques of bamboo have been developed and resulted in a large number of versatile products. Bamboo can be cut and laminated into sheets and planks. Laminated bamboo based panels was reported to be superior to wood based panels in almost all performance indexes (Yang et al., 2010).

To produce laminated bamboo, the cylinder culms must be converted into flat sheets or elements. The conversion of the cylinder shaped culms into flat sheets or elements can be made through the “splitting-pressing” (Figure 1) and “splitting-squaring” (Figure 2) method (Bakar et al., 2006), but only the splitting-squaring method can be applied for decoration purposes (Zhang et al., 2002). In this method, the culms are split into narrow strips and the resulting strips are edge squared piece by piece of even thickness and width with a planing machine before they are finally glued and pressed together to form laminated bamboo boards or planks.





Nevertheless, the mentioned method is neither practical nor efficient. The squaring of narrow strips into even thickness and width with a planer piece by piece is a time consuming and inefficient process. Hence, a new conversion method for converting bamboo culms into flat sheets (and the apparatus thereof) has been developed by Bakar et al. 2012. This method is called the V-grooving method.

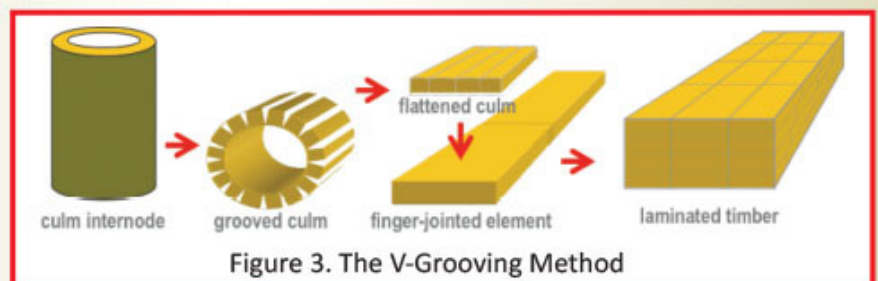
## 4. The V-Grooving Method

The V-grooving is a new, efficient, and practical method for converting cylindrical shaped bamboo culms into flat sheets that can be used for laminated

bamboo timber manufacturing. This method and its machine that was exhibited and got Gold Medal award at the PRPI (Pameran Rekacipta Penyelidikan dan Inovasi) Malaysia 2012 have been patented by its inventor under Malaysian Patent Filing No. PI 2012001327.

### 4.1. How does the V-Grooving method work?

The culm internodes are cut in a series of V-shaped grooves at a certain interval from culms outer-side. A special design grooving machine was developed for this process. The grooving intervals are pre-calculated and presented in a Grooving Table for operator use. These intervals depend on the culm diameter and thickness, as well as the groove angle. Each groove is purposely made to have  $\pm 1\text{mm}$  uncut portion (called the grooving cease) that serves as connector to make the culm keep intact, and give a hinge function necessary for the flattening process. Figure 3 shows how the V-Grooving method works, while Figure 4 shows how the V-Grooving machine looks like.



After the grooving is completed, the last groove is cut through and the groove surfaces are coated with certain glue. The culm is then flattened with a presser or clamper. Hinge function of the grooving cease will transfer the vertical forces into lateral ones and allow the entire grooves to close tightly forming a fixed, flat sheet. The flattened culm can be then simply planed on one or both of its surfaces with a planing machine and ready for use in manufacturing of laminated bamboo timbers or special decorative boards.



Figure 4. The V-Grooving Machine





## 4.2. Advantages of the V-Grooving Method

This method involves shorter process and simpler machine thus, can save the time and lower the production cost. In addition, the method involves simple and precise process which can save raw material and produce quality products. Matured bamboo culm (aged 4-year and above) having the minimum diameter of 60 mm and minimum thickness of 8 mm can be processed with this machine. The advantages of this method are summarized as follows:

- Involve more efficient and more practical process to reduce the production cost.
- Involve small and simple machine, supported with an easy-to-use Grooving Table that is suitable for small and medium-scale industries.
- Can produce LBT with hard and beauty bamboo skin suitable for decorative applications.
- Create job opportunity and new income generation for rural and suburban communities.
- Involve green technology to produce green products (as wood alternative) to fill up the gap of wood supply for wood industry.

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## 5. Conclusions

V-Grooving method (and its apparatus) is a new method to convert cylindrical shaped bamboo culms into flat sheets for laminated bamboo boards manufacturing. With this method, bamboo culms can be processed into wood alternative material efficiently and practically. This will not only give benefit to wood industry (through new alternative material supply), but also to the communities by providing opportunities for job creation and income generation.





## INTROP's Research Colloquium 2012

Date : 5-6 December 2012

Venue : Residence Hotel,UNITEN, Bangi

The colloquium's objective was to provide an intellectual platform for researchers and opportunities in improving the implementation of current project progress. It was attended by 70 participants, 39 of them were oral presenters and nine of them were poster presenters. The theme was *"Cutting Edge Research for Sustainable Green Innovation"*, in line with the vision to empower and inculcate innovative research for a sustainable environment.



## Response Surface Methodology in Bioprocess Workshop

Date : 20-21 June 2012

Venue : Computer Lab, Faculty of Forestry, UPM

The response surface methodology (RSM) is a methodology of constructing approximations of the system behaviour using results of the response analyses calculated at a series of points in the variable space. This method is applied in various fields such as chemistry, physics, engineering as well as biotechnology to find the optimum response. The objective of the two-day workshop is to provide both theoretical and practical aspects, especially in computing experience to their ability to use this methodology for process optimization in the field of biotechnology. This workshop is dealt with problems associated with application of statistical methods as a tool system optimization in the fermentation process.

The speakers of this workshop are Assoc. Prof. Dr. Rosfarizan Mohamad from INTROP, Dr. Tan Joo Shun from IBS and Dr. Nagasundara Ramanan Ramakrishnan from Monash University. This workshop attracted 27 participants from various government agencies such as UPM, USM, UiTM, MPOB, MARDI and MOSTI.

## Basics Remote Sensing & GIS Course

Date : 4 - 6 June 2012

Venue : Faculty of Forestry, UPM

The speaker for this course 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, Research Officer in INTROP and Ms 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, The Malaysian Department of Meteorology, UPM's Faculty of Forestry and Faculty of Agriculture. The three day course sought to introduce participants to the basic procedures in satellite remote sensing and map-making using image processing and GIS software (Erdas Imagine and ArcGIS 10). The output of the course was to ensure participants could process satellite images and make maps using the software.



## Course on Successful Professional Consultant

DATE: 3- 4 October 2012

Venue: Pullman Lakeside Putrajaya Hotel, Putrajaya.

Laboratory of Techno Economics, also known as EcoserVorganized organized a course on Successful Professional Consultant Workshop. The two-day course took place at the Pullman Lakeside Hotel, Putrajaya. The invited speaker cum facilitator for this course is UPM's renowned researcher and consultant, Prof. Dr. Mohd. Shahwahid Hj Othman. The learning outcomes were the ability to prepare consultation project proposals, adaptability to the requirements of Technical Panel and key attitudes in becoming a Successful Professional Consultant.

The course was attended by nine participants from various universities. The participants were trained on the following topics; i) How to obtain a consultant project; ii) How to perform successfully. The participants were also put through scenarios/experience based exercises to strengthen their knowledge on consultancy. The highlight of this course was a dialog with well-known consultants, Prof. Dr. Fatimah Arshad (Director of IKDPM) and Dr. Jean Marc-Roda (Fellow Researcher of INTROP).







## LIST OF INTROP ACTIVITIES 2012

ACTIVITY	DATE	VENUE
Training On Geotfert Capillary Rheometer	5 – 6 Jan 2012	Product Testing Unit, Lab. Of Biocomposite Technology, INTROP Tech, UPM
Amali Politeknik Sultan Salahuddin Abdul Aziz Shah, Shah Alam, Selangor	27 Feb – 16 Apr 2012	Laboratory of Biocomposite Technology, INTROP Tech., UPM
Talk on Analysis of Biomass Determination and Carbon Sequestration Evaluation	27 April 2012	INTROP Infoport, UPM
Seminar on High Speed Camera in Science & Engineering Application	27 Mar 2012	Seminar Hall , Occupational Safety Health Office, UPM
Visit by Secretary General of Ministry of Plantation Industries & Commodities	19 Apr 2012	Seminar Hall , Occupational Safety Health Office, UPM & INTROP Tech., UPM
Basics Remote Sensing & GIS Course	4 – 6 June 2012	Faculty of Forestry, UPM
Response Surface Methodology in Bioprocess Workshop	20-21 June 2012	Computer Lab, Faculty of Forestry, UPM
Successful Professional Consultant Workshop	3 – 4 October 2012	Pullman Lakeside Putrajaya Hotel, Putrajaya

## INTROP's VISITORS 2012

NO	VISITOR	COUNTRY/ORGANIZATION	OBJECTIVE	DATE
1	1. Mr Chen Jiquan 2. Prof Dr Su Jiangguang	IBFC, China	27 June 2012 Demonstration of harvester and decorticator 28-29 June 2012 4th Planning and Coordination Meeting	27-29 Jun 2012
2	1. Mr Rene Van Berkel 2. Ms Firoozeh Baroomand	UNIDO, Austria		
3	Mr Rafiqul Islam	BJRI, Bangladesh		
4	Mr Sietse Van Der Warff	CFC, Austria		
5	Mr. Rajib Jones Mitra	IJSG, Bangladesh		
6	Mr. Chua Chin Pen	UNIDO, Thailand		
7	1. Dr. Hao Wang 2. Prof. Alan 3. Dr. Jay	Excellence in Engineered Fibre Composites (CEEFC), University of Southern Queensland (USQ), Australia	Discussion for collaboration - related research and activities	5 Nov 2012
8	Dr. Subyakto	Indonesian Institute of Sciences (LIPI), Bogor, Indonesia	Discussion for collaboration - related research and activities	11 Oct 2012
9	Prof Koichi Goda	The Society of Material Science (JSMS), Japan	Discussion for collaboration - related research and activities	9 Nov 2012
10	Assoc. Prof. Dr. Zeinab Osman	Institute of Technological Research, National Centre for Research, Ministry of Science and Technology, Khartoum, Sudan	Plenary Speaker for INTROP Research Colloquium 2012	5-6 Dec 2012
11	Prof. Dr. Li De Fang	Visit by International Bast Fibre Crops (IBFC), China	Discussion for collaboration - related research and activities	7 Dec 2012
<b>NATIONAL</b>				
NO	VISITOR	COUNTRY/ORGANIZATION	OBJECTIVE	DATE
1	Delegation	Visit by Students of Persatuan Industri Komposit (PIK)	Lab visit	30 Mar 2012
2	Delegation	Ministry of Plantation Industries and Commodities (MPIC)	To view products and research progress after completion of EPU project	19 Apr 2012
3	Delegation	Visit from Excellence in Engineered Fibre Composites (CEEFC), University of Southern Queensland (USQ), Australia	Discussion and lab visit	8 May 2012
4	Delegation	National Kenaf Tobacco Board	To look on achievement on kenaf research at INTROP	7 Dec 2012
5	Delegation (40-50 student)	Final Year Internship Project, Faculty of Engineering, UPM	Lab demonstration and visit	27 – 30 Nov 2012
6	Delegation	Visit by Lembaga Kenaf Tembakau Negara (LKTN), Kelantan	Lab visit	7 Dec 2012
7	Delegation	Visit from Mieco Chipboard Berhad, Kuala Lumpur	Lab Visit	10 Dec 2012





## BRAINSTORMING vs BRAINWRITING

### - Write Your Brain Out -

In the previous chapter of INTROPica, we learned how people tend to carry out Brainstorming for discussions or problem solving. Now, let us learn about the Brainwriting technique. It is a technique for generating ideas for a group of people BUT with exclusion of our voices. Yes, it is done silently! You're probably wondering how ideas can be generated without saying it out loud to a group?

Before we go any further, it has to be said that there were so many methods for doing Brainwriting. The original version of Brainwriting was modified to suit organizational purposes. Although this method has long been used to spawn more ideas, to my surprise, Brainwriting is not even popular in our country.

I first learnt about Brainwriting at an Editorial meeting for the new chapter of INTROPica. The editor asked me to write a non-academic column which had nothing to do with what was going on in INTROP or in UPM. This was a challenge for me, being more acquainted with academic writing than non-academic writing.

At the same time, INTROP was having a programme to set benchmarks a forward-looking planning exercise for INTROP. The programme was known by us as 'Halatuju' – an annual exercise. For several days, we tried to set our mission to match those of UPM's vision and mission.

It was through this exercise that we used Brainstorming to identify laboratory activities in INTROP. The process was possibly flawed because some of the group members avoided expressing their ideas and worried whether others would privately judge them. Differences in personality also caused domination in the session by bigger personalities. Others took the safe passage of not contributing their ideas. Throughout the programme,

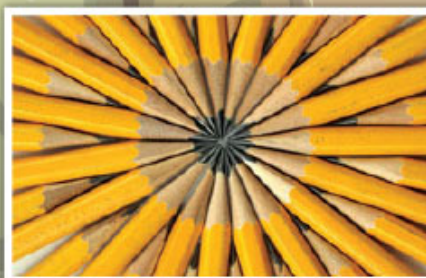
the scene of 'only one person can speak at a time' was apparent and one that looks all too familiar to me. It made me wonder if there were other options for us to generate ideas without a 'barrier'?

Returning home from the programme, I tried to find a solution for this problem. Yes, I turned to Google. At first attempt, I googled Brainstorming and was surprised to see the word Brainwriting. I immediately did a Google search on Brainwriting. The technique is very simple and people have been practicing it to generate ideas and problem solving. Brainwriting encourages a more uniform participation within the group. Instead of speaking out their ideas, participants write down their ideas. They can then engage with each other's ideas as opposed to being focused on the person who suggested the idea. Remember, the keywords for Brainstorming are to 'write' your ideas and

'engage' with other ideas. There is no discussion at any stage!

A study published in 2000 in Research Digest (a blog on brain and behaviour) reported that student participants produced more novel uses of paper clips using the Brainwriting technique compared to the equivalent of students working alone in a group. In the article, Peter Heslin, a business psychologist called for more papers on Brainwriting, especially since the technique could be effective and useful in some organizational cultures. For me, I think we could try this technique without diminishing the usefulness of Brainstorming in some situations. Why not give Brainwriting a try?

### Brainwriting







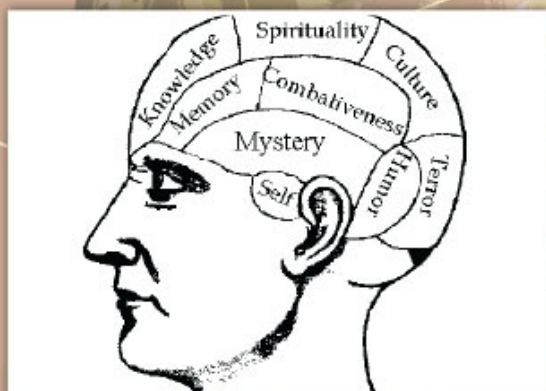
## How to use BW?

There were so many modified versions of Brainwriting on the web and thus, I would rather use this version - a simpler and more appropriate version for use in INTROP. The section after this showcases a version of Brainwriting that I have modified from the Mycoted Brainwriting page.

### 6-3-5 Method

6-3-5 means: 6 in group/3 ideas per round/5 minutes per round.

- Divide everyone into groups of about 6. Too many in a group is unmanageable, too few restricts the generation of ideas.
- Each participant starts with a prewritten BW form. The problem to be addressed is written at the top of the form.
- In the first round, participants have 5 minutes to write 3 ideas in the top boxes (1 per box) of the BW form. Often the problem is known ahead of time and the participants come in with the 3 ideas already developed. If this is the case, this initial time can be shorter.
- At the end of each round, the form is passed to the person on the right. As each person gets a form from the person on the left, they read all the ideas on the sheet and then add three new ones. The new ideas can be completely new, or can be variations of ideas already on the sheet, or can be additional developments to ideas already on the sheet. Ideas from other participants should foster new ideas. There is no talking or discussion during these rounds.
- The process is completed when each participant gets his own form back, now filled up with many ideas.
- The last step is to sort the ideas using a clustering method (described below).



## Clustering the ideas

Immediately after the brainwriting session, all ideas are copied onto Post-Its.

- Participants, as a group or individually, begin arranging ideas into "clusters." This is simply a sorting process; there should be no discussion of which ideas are better or worse. Some require absolute silence at this point.
- The group agrees on (or an individual assigns) a label to put on each cluster.
- If an idea can fit into two or more clusters, duplicates may be made.
- Clusters can stand individually if the goal is just to get a bunch of ideas. If some consensus must be reached, discussion can begin about which clusters to merge or eliminate.
- Consensus discussion tools include:
  - A) Cause Enumeration Diagram (Fishbone/Ishikawa diagram)
  - B) Affinity Diagram (group related clusters together; connect with lines)
  - C) Other prioritization techniques

Remember, this technique generates ideas and you may stumble upon the solutions to the problems stated through this process. Make your session more effective by appointing a moderator to monitor the flow of the Brainwriting session. Participants of the session need to avoid bad ideas and focus on the quantity of the ideas generated. Do not work on new ideas only, participants could develop other ideas and write them down. If you can't describe it through words, why not draw it? Lastly, make sure you write it clearly and neatly.

## Some of the BW links

<http://www.mycoted.com/Brainwriting>  
<http://bps-research-digest.blogspot.com/2009/02/forget-brainstorming-try-brainwriting.html>  
[http://creativethinking.net/DT14\\_Brainwriting.htm?Entry=Good](http://creativethinking.net/DT14_Brainwriting.htm?Entry=Good)  
<http://itemind.com/brainwriting/>  
<http://manualthinking.com/methods/manual-thinking-brainwriting/>

By : Mohd Lufti Mohd Tawil  
Science Officer, INTROP





## FELLOW RESEARCHER

**RODA JEAN-MARC**

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**Field of Specialization :**

My research interests cover the tropical forests and related industries, and I investigate the articulations between natural resources, social factors, industrial actors, from the global to the local. I focus on the industrial policies and strategies that increase or decrease the tension between global public goods (i.e. forests), economic competitiveness, and needs of the developing or emerging countries.

**Achievements in International Level :**

I am a senior research fellow at CIRAD since 1999. I am also research fellow at FRIM and at University Sorbonne Paris Cité, and I lead the CIRAD-FRIM cooperation activities. My carrier began in India, with a research grant on the timber trade in South India, after which I was successively Forest Officer in a french consulting company, director of studies for the Bachelor of forest products procurements in the College of Croigny (France), before to manage several R&D and competitiveness projects for the pulp and paper industries of France and Nordic countries. After my "temperate forest" period, I went back to my first love, the tropical forests, and have been working for CIRAD in 34 countries of Latin America, Africa and Asia Pacific. I have published 14 books and book chapters, 15 papers in impact factor & peer reviewed journals, 2 softwares, and over 40 other papers in journals, conferences etc.

**Recent Project :**

Supply and demand of rubberwood in Peninsular Malaysia (MTC, FRIM, CIRAD), and Domestic trade of timber products in Peninsular Malaysia (MTIB, MTC, FRIM, CIRAD)

**What is your feeling when joining INTROP?**

I am excited with the idea to extend my exchange with more Malaysian colleagues, in such a dynamic institute as Introp is.

**What is your strategy for the future as Fellow Researcher in INTROP?**

My mission here is to help to develop a cooperation platform between CIRAD and UPM, helping UPM to increase its international dimension in tropical forest products, public policies, environment and agro-agri research. The platform has started this year with my position in INTROP and my CIRAD's colleague Dr Djama in IKDPM. The platform already have a CRP6 international project (about forest industrial strategies and palm oil strategies) involving UPM, CIRAD, CIFOR and plenty of other international institutes, starting in 2013.

My mission also is to supervise as many master and Phd students as there will be volunteers in the my field of specialisation. The idea is to help them to develop their own original approaches in forest products (and other biomass / biocomposite products) economics. I will also help UPM scientists and students who want to do research with CIRAD, who want to extend their Phd with oversea activities or who want to cooperate with French Universities. Having also access to good students from France, I will also help those who want to do research in Malaysia and exchange their experience with UPM students. We got already a 5 months visit from Estelle Chavallard in 2012, and a French-Brazilian student is scheduled for 6 months in 2013. Last but not least, I have a few papers in the pipe, and a few new papers to write with INTROP and FRIM colleagues.

**What is your opinion of INTROP's Working environment?**

It is a great place with dynamic and friendly staff. Its academic environment is ideal, with all the UPM facilities and especially it's top level library, one of the best in Malaysia.

**How do you see INTROP 5 years onwards?**

INTROP has the best potential to spearhead as an institute of international dimension and activities.

**DR. MOHAMMAD JAWAID**

jawaid\_md@yahoo.co.in

**Field of Specialization :**

Hybrid Composites, Biocomposites, Nanocomposites, Polymer Blends, Wood Modification, Wood Technology

**Achievements in International Level :**

Publish 40 ISI Journal papers, two of my paper is one of 25 hot articles in Carbohydrate Polymers and Materials and Design Journal. Member of Society of Plastic Engineers, USA. Best PhD Thesis Award 2011-Universiti Sains Malaysia.

**Recent Project :**

Enhancement of Low Density Wood through Resin Impregnation.

**What is your feeling when joining INTROP?**

INTROP is one of the reputed Research centre of Universiti Putra Malaysia having very good laboratory facility and International Collaboration with CIRAD and other research centres and University all over world. So, excited to join INTROP as Fellow Researchers made me honor to work with INTROP

**What is your strategy for the future as Fellow Researcher in INTROP?**

To do high level research out put (ISI Journal papers, awards etc), supervise Master and PhD students. Do collaborative Research and Publication with Different local and abroad Universities. Develop and obtain Research grant at International level and also procure UPM RU and MOSTI grant. I try to find potential PhD and post doc fellow for INTROP and supervise research student of different universities and attract distinguish professor and researcher to work with INTROP.

**What is your opinion of INTROP's Working environment?**

Friendly and co-operative research environment at INTROP. Previously I worked with Faculty and School level of University, so learn new working environment with research centre and get nice fellow colleagues.

**How do you see INTROP 5 years onwards?**

I hope and wish that INTROP would be one of the reputed research centre in South-East Asia with the input of present researchers and recruitment of future staff and collaboration.





## POST-DOCTORAL

**ADRIAN CHOO CHENG YONG**

ccy.adrian@gmail.com

**Recent Projects:**

Thermal Modification of Oil Palm (*Elaeis guineensis*) and Bamboo (*Gigantocloa schortechinii*) in buffer medium for improvements in physical, mechanical and durability properties.

**Field of Specialization :**

Wood Science and  
Biocomposite Technology

**What is your feeling when joining INTROP?**

I would say that I feel at home here as it was a natural step to take since I completed my doctoral studies in INTROP.

**Achievements in International Level :**

3 papers and 2  
Conferences.

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

I plan to write papers and submit patent claims to increase my output as a researcher. Getting involved in various projects would also help increase my working experience and scope of research. The opportunity to guide post-graduate students will help me prepare for my goal of being a lecturer someday.

**What is your opinion of INTROP's Working environment?**

So far, it has been a really pleasant experience to work in INTROP as I have personally known most of the staff for a few years now.

**How do you see INTROP 5 years onwards?**

If INTROP continues to advance and expand at its current rate, I see a very real possibility of INTROP becoming the international centre and leader in Tropical Biocomposites and Forest Canopy Management, in line with its goal.

**FARIDEH NAMVAR**

farideh.namvar@putra.upm.edu.my

**Field of Specialization :**

Medical Biotechnology

**Achievements in International Level :**

6 Patent, 10 scientific papers, 10 Conference Paper and Posters, 2 Books, 5 Awards

**Recent Projects :**

Development of Teeth Whitening Strips

**What is your feeling when joining INTROP?**

I have been working in medical field for about twenty years. During that period, I had the opportunity to collaborate with different research team especially in field of natural product. Joining INTROP is a great chance for me to extend my knowledge in biomedical properties of natural product from tropical forest

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

In my opinion there is a gap between research only focus on product from tropical forest and research which focus

on biomedical properties of this products. Post-Doc in INTROP give me this opportunity to link this two areas for generation result that I believe will be a significant progress in biomedical properties of natural forest products. I would like to have more contribution in achievement of the INTROP's objectives by suggesting more research projects with different INTROP's staff, publish patent or paper, and produce the products. Furthermore, I would like to help the collaboration between INTROP and similar institute in IRAN like Applied Biology Research Center- Mashhad.

**What is your opinion of INTROP's Working environment?**

INTROP's working environment has good communication and great teamwork, so therefore, that to me, is the ideal working environment.

**How do you see INTROP 5 years onwards?**

INTROP's working environment has good communication and great teamwork, so therefore, that to me, is the ideal working environment.





# Electrical Safety Tips



## OFFICE

- Clean up the clutter.
- Keep liquid away from all equipment connected to the electricity supply.
- Do not use unsafe equipment or poorly maintained appliances.
- Examine all cords on a monthly basis. If cord is frayed, discard it immediately.



**If these happen to you, immediately, call your technician to make sure there are safe.**

- i. Frequent problems with blowing fuses or tripping circuit breakers.
- ii. A tingling feeling when you touch an electrical appliance.
- iii. Discolored or warm wall outlets.
- iv. A burning or rubbery smell coming from an appliance.
- v. Flickering or dimming lights.
- vi. Sparks from an outlet.



**Emergency Number : 999**

**Fire Fighter : 994**

**UPM's Security Office : 03-8947 1999**



<http://www.facebook.com/introp>

# ICKAF 2013

2nd International Conference on Kenaf and Allied Fibres

3rd – 5th December 2013

Grand Seasons Hotel, Kuala Lumpur

Institute of Tropical Forestry and Forest Products (INTROP), Universiti Putra Malaysia (UPM) successfully organized the 1<sup>st</sup> International Conference on Kenaf and Allied Fibre (ICKAF) in 2009. ICKAF 2009 has attracted local and international participants with a total of 150 participation come from Malaysia, Bangladesh, India, China, USA, Poland, Australia, Singapore, Thailand, Iran and France.

Innovating Biofibres for Sustainable Future is timely as the interest in biofibres industry is growing. ICKAF 2013 will expand it's scope covering other biofibres such as bamboo, sisal, abaca, coir, agricultural biomass etc.

We invite you to come to Kuala Lumpur, a capital city of Malaysia to share and learn about the state-of-the-art, trends, and perspectives on what the future holds in this dynamic field of natural fibre, and experience the Malaysian hospitality.

## Call For Papers

### ABSTRACT FORMAT

Abstract(s) (300 words maximum) for oral and poster presentation should be written according to the format and must be submitted to [ickaf.introp@gmail.com](mailto:ickaf.introp@gmail.com) together with the online registration form

### TOPICS

#### Upstream

- Breeding
- Seed Production
- Good Planting Practices

#### Midstream

- Biocomposites
- Fibre Sciences
- Fibre Technology and Engineering

#### Downstream

- Product Development
- Prototyping
- Industry Experience
- Economics
- Techno Economics



### ORAL & POSTER PRESENTATIONS EXHIBITION

Please refer [www.ickaf.upm.edu.my](http://www.ickaf.upm.edu.my) for abstract format

### IMPORTANT DATE

Early Bird Deadline	30 July 2013
Abstract Deadline	31 May 2013
Acceptance of Abstract	30 June 2013
Late Registration	3 Sept 2013

Complete your details using the form provided in our webpage quickly and get your special rate. Act now!

**Cancellation Policy:** Any cancellation must be made in writing not later than 30 days to the first day of conference.

### REGISTRATION

		With Technical Visit		Without Technical Visit		Exhibitor (RM)	
		Local (RM)	Internations (USD)	Local (RM)	International (USD)		
		Student	Standard	Student	Standard		
Early Bird	-	800	550	-	700	500	2800*
Normal	600	900	650	500	800	600	

\*Booth size is 3m X 3m with entitle one (1) participation

## Innovating Biofibres for Future



### ICKAF 2013 Secretariat

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## It's Monday, go to work!



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ROBERTO LINDQVIST



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"If you're calling to criticize something I did, press 1.  
If you're calling to criticize something I said, press 2.  
If you're calling for any other reason, you probably dialed the wrong number."

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"If you write your autobiography when you're old, you can see where you've been. If you write it when you're young, you can see where you're going!"



"I'd like to give you a raise and promotion, but that wouldn't be fair to others who don't stay late or work as hard as you."



"Whatever your mind can conceive and believe, it can achieve, as long as it rhymes."

## QUOTES

*When one of you eats, let him eat with his right hand, and if he drinks, let him drink with his right hand, for the Shaitan (Satan) eats with his left hand. Do not give or take with the left hand.*

"Muslim"

*Try to pass your mornings and evenings in a state where your heart is free of all ill feelings, jealousy and hatred for everyone, and remember that this is my sunnah (way of life) and he who loves my sunnah will be with me in Paradise*

"At-Tirmidhi"

*Wealth is not in riches but in contentment*

"Al-Bukhari & Muslim"

*Renouncing the world does not mean that one makes lawful things unlawful or waste property. It means one should put more trust in the hand of Allah than his own hand and when trouble reaches him, he should be more concerned with being desirous of its reward (by being patient) than grieving over the fact that the trouble reached him in the first place.*

"Ibn Majah & At-Tirmidhi"

*Indeed, truthfulness leads to righteousness and righteousness leads to paradise, and a person continues to be truthful until he is registered as truthful in the sight of Allah*

"Al-Bukhari & Muslim"

*Verily, charity appeases the wrath of Allah and eases the sufferings of death*

"At-Tirmidhi"





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