

bamboo bulletin

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Photos from the Biochar Workshop held at Hans Erken's property in Maleny, March 2012. Photos by Hans and Steve Swayne. See Hans' story on page 25.



A TLUD burner producing a quality product Biochar.



Paul Taylor, in yellow tee shirt, explains how to set up a large TLUD burner to several participants.



The finished product.



The production area at Hans' property.



Hans explains about packing the bamboo into the can.

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On the cover: Tarannum Afrin and Professor Liese at the 9th World Bamboo Congress in Belgium, where Tarannum presented her paper, see page 11.

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PLEASE NOTE: This "Bamboo Bulletin" contains the views of many authors, and the Bamboo Society of Australia Incorporated is not responsible for the accuracy of such material, nor do the opinions expressed necessarily represent those of the BSA Board. We welcome the submission of articles.

Bamboo Society of Australia Annual General Meeting 2012

This year the AGM will be held at the property of Jim Mahoney at Moorland, mid North Coast, NSW. **Date is Saturday 10 November. Please keep it free.** There will be further information closer to the time.

Presidents Report by Bob Gretton

Hi to all BSA members, thanks as always to the stalwarts of the BSA without whom our Society wouldn't function. Another very interesting Bamboo Bulletin has appeared from the depths of the drop box. Reports from some interesting workshops together with articles that Geoff gathered and cajoled from around the bamboo world – great!

Barry, Kevin and I are all serendipitously in Bali in May and June. BOC and I have arranged visits to bamboo projects and organisations that I hope we will share with you in the November Bulletin.

Last week-end the West Australian Bamboo group gathered for the spring meeting at Jude's and my place in Denmark on the south coast of WA. On the Saturday night we shared a meal, socialized and watched slides of Thailand, Bali, England and France. The plant auction that funds the WA meetings was held in the dusk – most interest was generated by a specimen of *Himalayacalamus asper* and Chinese Dwarf (*Bambusa Guangxiensis*).

Kelly and David have purchased an amazing property in Darlington that is fully fitted out with nursery tunnels, irrigation and a commercial hydroponics set-up. We all await the start of a new bamboo nursery. It was great to see a few slides of the bamboo tour in Thailand that many Australian's participated in (and an American and a Kiwi or two).



Nick Hogarth was at the meeting for the first time for many years. Nick has been busy in Asia working on a doctorate which has a bamboo component. Watch out for an article by Nick in the next Bamboo Bulletin. On the Sunday morning we enjoyed a walk around our garden. The *Chusquea* species pictured below is in an area I have planted with mountain bamboo. Autumn is this species best season and its unusual habit was enjoyed by all. I don't have a species name,

any ideas? I have seen a picture of this bamboo arching over the Inca trail near Michu Picchu.

The other property visited on the Sunday was a derelict landscaping project that had many clumping and running bamboo planted. I had been told by a couple of people that one of the running bamboos was a dangerous weed that was invading the adjacent National Park. In truth it proved to be a half dead *Pleiobastus* sp that had run 10 mtrs before running out of water under some local Peppermint trees (*Agonis flexuosa*). The reputation of bamboo often suffers from the perceived, and occasionally real, weediness of the running bamboo, as well as the unexpected vigour and height of some clumping species. I guess it is incumbent on us all to continue to educate the masses and advise people to plant appropriate species for their situation.

Talking of education today marked a milestone in the education of my 10 month old grand-daughter. One of her first words was "bamboo" repeated numerous times whilst walking through the bamboo grove. It reminded me of Lewis Carroll's "A Tangled Tale" and the illustration below. Is that you on the left John E? I deny being the guy in the middle. Bob G

(Bob, I think your *Chusquea* species is *liebmanni*. I also have it. Hans)



"WHY DO THEY SAY 'BAMBOO!' SO OFTEN?"

Editorial by Geoff Kyle

Well, it certainly is good to be back in the chair for this issue of the Bamboo Bulletin. My thanks go out to the other scribes and artists in the Bamboo Bulletin Factory, who covered for me during my absence in the second half of last year.

In this issue, the BB has another look at the bamboo fibre controversy after some readers and retailers responded to an article by Barry O'Connell. We present the views of Marion Hoenig and Sean Cody, who both have a very positive view of the current array of bamboo textiles that are available in the marketplace. To balance that, we also present a sample of the emerging science of bamboo textiles. An extract from the research work of BSA Member Tarannum Afrin shows that, where textiles are concerned, not all "bamboo" fibres are the same.

Also featured in this issue is the paper presented by Tarranum to the 2012 WBO Conference in Antwerp, Belgium. The paper provides a detailed view of the current direction of research into the unique properties of bamboo fibres and methodology for extracting them as a precursor for textile production without the use of environmentally dangerous reagents and practices. Your editor is sure that the argument will not end here – or soon. However, empirical facts are necessary if the seed is to be sorted from the chaff, as it were.

This issue also features a report on the latest bamboo charcoal workshop that was held recently at Byron Bay in Northern New South Wales. Biochar is creating huge interest in Australian bamboo circles, and many members are keen to learn more. In a previous issue, the Bulletin presented the increasingly refined backyard experimentations of Hans Erken, who also facilitated an earlier biochar workshop at his plantation at Maleny, Queensland.

Another controversy has been rearing its head on the internet bamboo groups in recent months. It would seem that the advent of carbon trading schemes in various parts of the world has encouraged bamboo growers to think about harvesting carbon credits as a supplemental income. There has been much comment both for and against this concept. In this issue, the Bulletin presents a sample of opinions from prominent experts Jean Emmanuel Ndzana, Yannick Kuegl, Raimund Duking, and Robert Roark.

BSA Member Stuart McConville has come up with a new preservation and curing method for bamboo, and has provided a description of the process for the interest of readers. And Di Hill contributed an

interesting piece about residual negative attitudes to bamboo – especially in suburban contexts. This is an old story that your editor thought had long ago been laid to rest.

Also in this issue are reports on a new type of multi-purpose tool that can be of great utility to bamboo farmers, a waste heat engine that is being produced in America and which can be powered by bamboo, and a suggestion from Wadys Wadsworth about the practical realities of the supposed "carbon economy".

Meanwhile, in the tropical north of Australia, autumn slides into winter. Big Mama Monsoon has departed after endowing country with the annual liquor of renewal, and the nights are becoming cooler. Frost tolerance is hardly a problem for bamboos in this region, but the humans reach for Ugh Boots when mornings are a chilly 15C. The native Arnhemicas that crowd the river running through my block are quiet now, but rioted over the summer months and sent up a plethora of strong new culms, as well as air-layering themselves across several tracks. When country began to dry out along the boundary between my block and Litchfield National Park, my neighbour and I went looking for the legendary – yet thus far poorly documented - off-type striped *B Arnhemica*. Interested readers can see the results in the November issue of the Bamboo Bulletin.

2012 INBAR Bamboo Tour 19-30 June 2012, Zhejiang, Sichuan and Guangdong, China

The objective of the annual bamboo study tours is to share the experience of Chinese bamboo development and to promote bamboo development in other countries. The tours commenced in 2005 and have run annually since 2007. They are very popular and are targeted at those wishing to gain a better understanding of the potential and practice that bamboo-based development have to offer, based on the China experience. [On the INBAR website > <http://tinyurl.com/cntjndf> you can read the reports of 2005, 2007, 2008, 2009, 2010 and 2011 bamboo tours and see some photos.

The 2012 Bamboo Tour will visit Zhejiang, Sichuan and Guangdong provinces. The cost in China is 2300\$/person covering accommodation, food, transportation and entrance tickets in China during 19-30 June. Participants should cover their international flights and the domestic flights to Hangzhou and from Guangzhou as well as travel insurance and visa fee.

In Zhejiang we will visit some leading bamboo flooring manufacturers such as DASSO, who produced the bamboo fire-proof ceiling in Madrid international airport, which won the 2006 Sterling prize. DASSO is also producing bamboo interior veneer for 70,000 BMW cars per year and 45m long bamboo wind turbine blades, producer of strand woven bamboo lumber and floor, companies for bamboo concrete form and fiber board, bamboo curtain and mat and bamboo shoot processing, bamboo extract like flavonoid, bamboo beer. We will also visit Wenzhao, the biggest bamboo charcoal company (charcoal and vinegar) and the China Bamboo Charcoal Museum, the only bamboo charcoal museum in the world, some primitive processing workshops (bamboo strips) at community level, companies for bamboo furniture, bamboo processing machine and Anji bamboo product market (hundreds bamboo products including bamboo clothes). We will also visit the biggest bamboo botanic garden in the world, Anji Bamboo Garden, which has more than 300 bamboo species plus four giant pandas, and Chinese Bamboo Museum in this garden; High-yield bamboo plantation, bamboo film production base (eg Crouching Tiger, Hidden Dragon) and eco-tourism sites, ornamental bamboo nursery. We will visit some bamboo research institutions like Zhejiang Agro-Forestry University (visiting bamboo products showroom, bamboo charcoal, bamboo tissue culture lab). We try to initiate dialogues with local politicians and experts on bamboo sector policies and technology, which encourage the enterprisers to invest in other bamboo production countries such as Africa, Asia and America.

In Sichuan province, we will visit Wangjiang bamboo park (near 200 tropical bamboo species), Living Water Park (which shows waste water treatment by plants and biotechnology and won UNEP award), Chengdu Giant Panda Center (more than 100 pandas!), world famous Dujiangyan irrigation system, 2008 Earthquake Museum, INBAR bamboo handicrafts training base and China Bamboo Weaving Museum in Qingshen.

In Guangdong province, we will visit a bamboo museum, tropical bamboo plantation, tropical Bamboo processing etc and famous Lankun Bamboo Ecotourism hotel and South China botanic garden (including collection of many tropical bamboos).

For more information, please contact: Ms. Li Xin and Dr. Fu Jinhe, INBAR. E-mail: xli@inbar.int and jfu@inbar.int or see the INBAR website.

**International Training Workshop on Bamboo
and other Non-Timber Forest Products
Zhejiang, China, 03-23 September, 2012.
from Mr. 8¹ and Jin Wei²**

Nihao my Australian fellow bamboo enthusiasts. Nihao is hello in Chinese and I used the word because this email is coming from China and the subject training/workshop will also be held in China.

It would, without a doubt, be nice if you could be a part of this training workshop considering that bamboo is our common denominator. This is an activity that occurs annually every September in Zhejiang, China. This is the International Training Workshop on Bamboo and other Non-Timber Forest Products (NTFPs) organized by the International Network for Bamboo and Rattan (INBAR). The schedule for this year will be 03-23 September. Only 30% of the total time will be spent in the classrooms and the rest of the 70% will be for field visits to farms, villages, factories, cities and beautiful eco-tourism sites.

Your participation could most probably open for you new insights about bamboo considering that China is the lead country in bamboo utilization and that it has 7M hectares and counting of this miracle plant. It would also be nice if you could share anything that you know about bamboo for the participants from other countries.

A brief INBAR description of the event follows, but please feel free to contact me should you have other questions or need some help in this regard.



Mr 8

Mountainous and hilly areas are rich in resources, including forests and minerals, and are the sources of much of the world's freshwater. Forests in mountain areas provide essential ecosystem services, protect

biodiversity and are essential for the mitigation of, and adaptation to, climate change. In many countries, especially in developing countries, mountainous and hilly areas are homes to a disproportionately high percentage of poor people whose lives and livelihoods largely depend on the effective and appropriate management of the natural resources around them. Therefore, improving rural societies, economies and environments in mountainous forest areas should be one of the top concerns of the international community.

The United Nations Conference on Climate Change (COP 17) held in December of 2011, has reconfirmed the importance of developing harmonious human-nature development models through sustainable ways of managing natural resources. However, how to balance between ecosystem and local economic/livelihood development, and achieve sustainability in both aspects has been a long standing problem that needs urgent solutions. Up to this day, the utilization and development of non-timber-forest-products (NTFPs) is identified and considered to be one of the most important feasible solutions for forest sustainable management and local community sustainable development.

The systematic development of ecosystems in China and many countries of the world have generated many successes and have produced many new models that led to win-win situations.

This training workshop will be held in Lin'an and Anji. Both locations are recognized in China and the international society as successful examples of integrated sustainable development in mountain areas. The well-developed NTFPs industries and eco-tourism, the affluent and modern mountain villages, the beautiful forest eco-environments, have impressed every visitor in Lin'an and Anji. The two locations are respectively the best models for developed bamboo shoots and bamboo processing industries in China. The systematic experiences accumulated within these two locations provided practical study bases for researchers and developers.

China is well-known in the world for the long history, large production scale and complete supply-chain of NTFPs development. For example, traditional Chinese medicine utilizes NTFPs as materials source for thousands of years. Many species of animals and plants have been utilized and a large scale traditional medicine production system has been established. China now produces 70% of the world's edible fungi. China does not only have the largest bamboo industry in the world, but it also has a long established history of bamboo culture. The NTFPs development of China is an organic combination of sustainable

resource cultivation, highly efficient industrial processing, smooth marketing network and a constructive institutional culture. NTFPs and their production has become one of the supporting poles of the economic development in the forest areas of China.

This training workshop will provide a platform for people from various levels and fields of work that are concerned with mountainous development, rural development, environmental protection, natural resource management, etc., and to share and explore the best practices in sustainable and integrated development in mountainous and hilly regions, especially, the technologies and products of NTFPs.

1. <http://bynatureandmr8.multiply.com/>
2. wjin@inbar.int

9th World Bamboo Congress Belgium, April, 2012. by Susanne Lucas¹

Wow, what a week! I'm not the only one to express those words ... many of the participants said the same!

The 9th World Bamboo Congress kicked off unofficially in the lobby of the Lindner Hotel on Monday, 9 April, as participants came from their homes in Japan, Mexico, Taiwan, Switzerland, Argentina, USA, South Africa, and beyond to meet other "bamboo people" and share their experiences. The next day, officially, at the University of Antwerp, the 9th WBC opened with fantastic keynote presentations by Johan Gielis, Marc van Montagu, Lynn Clark, Walter Liese and Masatoshi Watanabe. Over 250 people were in attendance.

The program list is still up on the WBC website for those who want to see it, and the live-streaming is still available on <http://tinyurl.com/72gu9bb>

Also, great news is that we will also have the official proceedings, all the papers submitted for publishing, available for download on the WBO website, as well as the powerpoint presentations as shown at the WBC. We need some days to acclimate post-WBC, so look for this update in early May. We'll let you know!

After an amazing Opening Reception at the City Hall with the music of Take Dake, and three days at the University and 50 presentations later, we moved to a rural setting called DeKolonie. As guests of the

Oprins family, our group arrived to this magnificent old brick barn, enhanced with a fantastic bamboo welcome gate created by Georges Cuvillier. Bamboo geodesic domes (created by BeBamboo) scattered around the building offering warm refuge and ambiance, and other works of bamboo art beckoned beyond. Inside the barn, bamboo products and projects were on display, and in the main hall, <trumpets sounding>, ambassador FLYBOO was soaring overhead! The creation of Michel Abadie (WBO President), this airplane made of bamboo has become a symbol for all that bamboo can do, and as messenger, it carried us all under its wings as we entertained two and half more days of 40 fascinating presentations, and great camaraderie. Saturday night brought a great concert by Take Dak e, music from Indonesia by a contemporary anklung group, fireworks, lots of food and drink, open fires to keep us warm, dancing and hours to share together.

Sunday was simply an amazing finale. Following a progression of subjects all leading to the purpose of what bamboo can do, Gunther Pauli, founder of ZERI and the Blue Economy, gave a powerful and motivational presentation entitled, Bamboo: a symbol of the new economy.

This WBC was a tremendous collaboration of an amazing team of people in Belgium : IKEBANA: Johan Gielis, Geert Potters, Frances Schutte, Davina Van Goethem, Litsa Bogaerts, Luc Boeraeve and a gang of volunteers, Jan Oprins and his family, a scientific committee to review all of the papers, the facilities at UA, the artists and builders at DeKolonie, the musicians, etc.

But really what made the success was the fabulous attendance from over 30 countries, with prominent VIPs like the Bamboo Pioneers Walter Liese, Masatoshi Watanabe, Shuen Chao Wu, INBAR staff of Coosje Hoogendoorn and Jinhe Fu, as well as dedicated researchers from India like Nirmala Chongtham, PhD students like Tara Afrin and Andrea Melnychenko, designers like Pablo van der Lugt , Rebecca Reubens, Kankana Dev, and all the <bamboo people> who have come together as a family to share and exchange and initiate the bamboo revolution. Thanks to all of those who came to Belgium.

My deepest respect and gratitude to you all.

1. Susanne Lucas is the Executive Director, WBO

The following three articles are in response to an article by Barry O'Connell in the December 2011 issue of the Bamboo Bulletin , entitled Update On Bamboo Fibre.

Responding to Barry O'Connell 1 Bamboo Fabric by Marion Hoenig¹

As a new member, of the Bamboo Society of Australia, who sells 100% bamboo sheets and towels, I was interested to read the article from Barry O'Connell. I too have read reams on the problems and benefits associated with turning bamboo grass into material. Eastwind Textiles main focus is on the cleanliness of water run-off in comparison with growing cotton. Aside from the benefits to the earth, 100% bamboo towels last as long as any other towel and can be washed in any washing machine and popped in the dryer, although pulled straight and given fresh air on the line is best. They tell me when my towel is old and worn I can put it in the compost and it will decompose. I have had mine for three years and it isn't ready for the compost bin yet.

The sustainable benefits, or otherwise, of bamboo fabric is a complex issue, so I will just respond to the three major points in Barry's article.

(1) Magical Qualities and the USA Federal Trade Commission. 'clean, green, antibacterial and other near magical qualities', (B. O'Connell, Bamboo Bulletin Vol. 13 No.2 Dec, 2011.)

Organic production is based on a system of farming that maintains and replenishes soil fertility without the use of toxic and persistent pesticides, fertilizers and genetically modified seed (GreenBiz 2006).

Hebei Jigao Chemical Fiber Co in China hold the patent on the process for turning bamboo into fibre. The bamboo is grown in accordance to the international organic standard of OCIA/IFOAM and the USDA National Organic Program. The proof of the ecologically sound methods behind bamboo production is the fact that all of the fibre produced at the facility in China is Oeko-Tex 100 certified. This means that every company working with bamboo starts with the same raw material and that this material is not contaminated

http://en.wikipedia.org/wiki/Bamboo_textiles

Responding to the FTC, one of the companies 'forced' by FTC to call bamboo fabric 'viscose made from bamboo' wrote 'Regarding antimicrobial properties, the texts that we provided them with that show bamboo fabric inhibits the growth of bacteria may not have satisfied their requirements, but anyone who has ever worn a bamboo shirt or socks and sweated in them knows that the resistance to odour is there' <http://tinyurl.com/etwbnk>

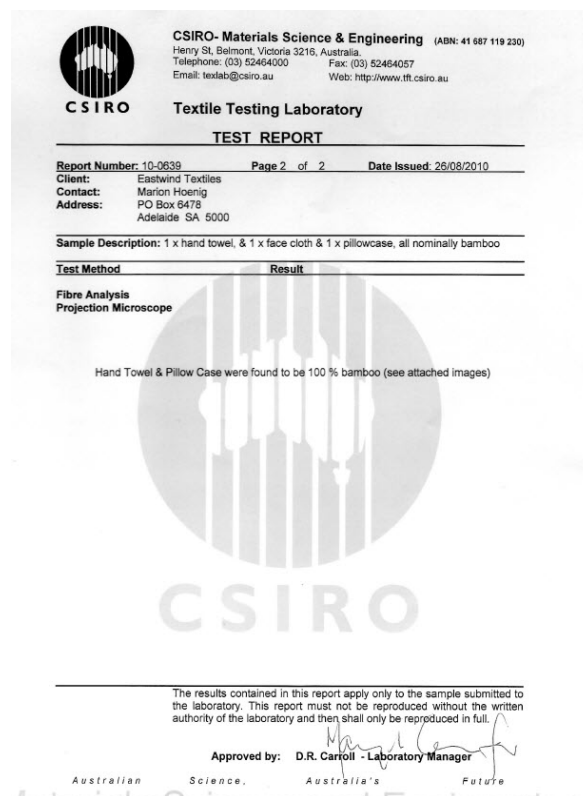
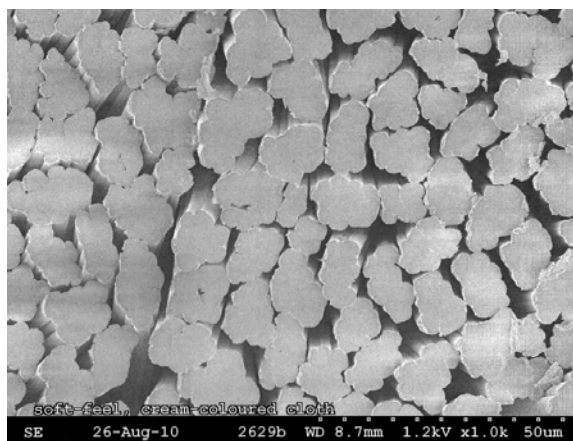
Each of the three companies only agreed to sign the consent order to change their naming and descriptions of bamboo fabric after 12 months of working with FTC. They had limited resources.

When reading about cotton production, one finds information such as 'Farmers in the US apply nearly one-third of a pound of chemical fertilizers and pesticides for every pound of cotton harvested. The United States is the second largest cotton producer in the world after China and the world's largest cotton exporter....US Government heavily subsidises American growers of cotton...\$2.06 billion in 2001, according to the Department of Agriculture. Recent rulings by the World Trade Organization find that the US has been illegally using domestic cotton subsidies to bolster its dominant position in the market. The scale of government support to America's 25,000 cotton farmers is staggering, reflecting the political influence of corporate farm lobbies in key states.

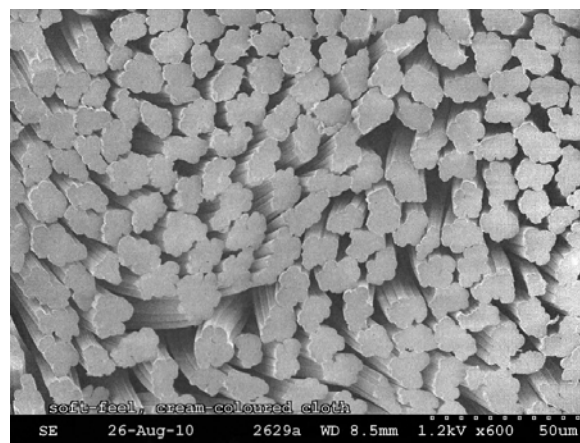
The bamboo kun in bamboo stops odour-producing bacteria from growing and spreading in the textiles. A quantitative antibacterial test was performed by the China Industrial Testing Centre in 2003 in which 100% bamboo fabric was tested with the bacterial strain type *Staphylococcus aureus*; after a 24 hour incubation period, the bamboo fabric showed a 99.8% antibacterial destroy rate (Sustainable Textiles: the Role of Bamboo and a Comparison of Bamboo Textile Properties, Journal of Textile and Apparel, Technology and Management, North Carolina State University, by Marilyn Waite, Engineer for Sustainable Development)

(2) 100% Bamboo Fabric is a viscose the same as every other cellulose base viscose/rayon – e.g. wood chips, flax, hemp.

Eastwind Textiles has a certificate and a photo from CSIRO that says our cream towels and our white sheets are 100% Bamboo.



The CSIRO Certificate



The fibres tested by CSIRO

(3) - Buyer Beware. Bamboo t-shirt was as cheap as a cotton one and so must be nothing more than...'rayon'. Costs quoted: Viscose from Bamboo \$4 a kg, Bamboo linen \$11 kg.

Eastwind Textiles is paying between \$US20 to \$US27.00 a kg for both towels, sheets and t-shirts. Viscose/rayon from cellulose, in any case, is better than man-made fabrics such as polyester which needs a diminishing resource - oil.

All comments welcome. BSA members will receive 10% discount on their orders.

1. www.eastwindtextiles.com.au

Responding to Barry O'Connell 2 Sean Cody of Bamboo Fiji¹

The fact that Bamboo fibre is a man-made fibre does not alter its benefits. It is obviously not bamboo. It had to be manufactured into thread and then woven into cloth. How can this be misleading. The fact is the thread originates from 100% bamboo.

By saying that I am stating a fact, not misleading you. If you want to call it rayon or bamboo viscose it is just semantics as the base is still all bamboo.

You say that because it is viscose from bamboo it cannot be different than say viscose from pine or some other plant. In this you are entirely wrong. The thread is from bamboo and several characteristics of the bamboo are evident in the final product. They include high UV protection, great breathability, antibacterial benefits, temperature regulation, hypoallergenic and the simple and most environmental fact being they do not use pesticides. I agree that is magical but it is not misleading. And you do not get that from cotton.

You use the term "Buyer beware" so I will use the term "Reader beware". I find your article erroneous and misdirecting.

As a manufacturer of Bamboo clothing I am convinced of several things. Firstly the garments we make are extremely comfortable to wear. They breathe better than most products and have a fantastic drape. As previously mentioned the UV protection is great and they certainly absorb more moisture than cotton garments. There is an antibacterial nature to these garments that reduces body odour. They travel well and are durable.

So let's make this clear - they are comfortable, long lasting garments that look good on you. If that equates to value for money then Buyer does not have to Beware.....that got good value for their money. Oh yes, and their shirt did not add to the pesticide pollution and when they are finished with it the shirt is biodegradable.

And it is from Bamboo. Nuff said.

1. BambooFiji,
bamboozlefiji@yahoo.com
www.bamboofiji.com
www.windwardapparel.com

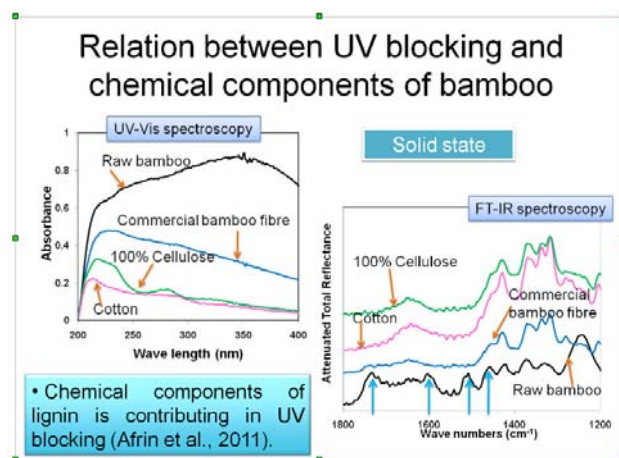
Responding to Barry O'Connell 3 Tarannum Afrin of Deakin University²

I have done UV-Vis spectroscopy both in solid state and on extracted chemicals from bamboo. I have also compared this results with FT-IR spectroscopy.

I have compared fibres from raw bamboo plants (in solid and powder form), bamboo extracts, and my naturally produced bamboo fibres, with cotton and commercial bamboo fibres, (which are rayons).

I have noticed the bamboo rayons have very poor UV protection compared to the raw bamboo plant and my fibres. The reason behind that has been identified as the absence of functional chemical components such as aromatic and carbonyl groups in lignin region (roughly 1200 to 1800 cm⁻¹) in the case of bamboo rayon and cotton.

Bamboo rayon is produced by dissolving it into harsh chemicals to free the cellulose rich substances, and cellulose is a kind of carbohydrate which doesn't have any functional groups to actively participate in UV blocking and antibacterial properties. You can see these statements elaborated further in my journal papers, but here are spectra which show the basic point.



Claims made for bamboo rayon fabrics are not confirmed by scientific tests

1. Tarannum Afrin is a PhD student at Deakin University. Her research work on extraction of bamboo fibres by mechanical and environmentally friendly methods has attracted high acclaim, and she was invited to present her findings to the WBO Conference in Antwerp this year. Tarannum has extensively researched the special properties attributed to bamboo fibres and has tested both natural bamboo fibres and viscose rayons made from bamboo. Her work featured on ABC Compass and appeared in the Bamboo Bulletin, Vol.11,#1. Tarannum's research work appears in the following article.

Novel Approaches to Process Bamboo Plants into UV-blocking Fibres

by Tarannum Afrin¹, Takuya Tsuzuki.

This article is an edited version of a scholarly paper delivered by the corresponding author to the WBO Conference in Antwerp in 2012. The author's research work into the properties of bamboo fibres and methods of isolating them from whole bamboo in such a way as to preserve those properties and minimise contingent deleterious environmental effects, provides empirical evidence that informs a scientific evaluation of many of the claims being made about bamboo textiles in the market place. Ed.

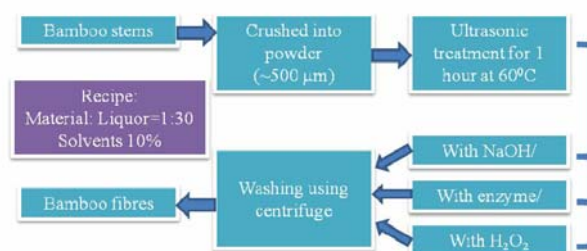
Currently viscose production methods are primarily used to process bamboo into commercial textile fibres. However, viscose methods use large quantities of chemicals and hence the process is not considered as environmentally friendly. The process also fails to retain bamboo's inherent unique properties such as ultraviolet (UV) screening and antibacterial functions. Hence, it is necessary to design an effective and more eco-friendly manufacturing method that would also retain the unique properties of raw bamboo plant into the fibres. In this research, bamboo was processed using new methods involving thermo mechanical treatments such as ultrasonication, shaker milling and boiling with continuous stirring. Sodium hydroxide, hydrogen peroxide, enzyme and water were used separately in this process and their effects on fibre processing were compared. The morphology and UV shielding ability were analysed before and after processing. It was demonstrated that bamboo can be processed into fibres using only water and ball milling without the aid of any hazardous chemicals. The combination of mild acid hydrolysis and ultrasonic treatment with hydrogen peroxide was effective in the fibre separation and provided better appearance of fibres.

The textile industry is considered as one of the worst polluters due mainly to the use of non-ecofriendly raw materials and chemicals during fibre production. Even cotton, the most common natural fibre, has been identified as one of the most non "green" crops because of the use of high amounts of irrigation water and pesticides. The price of cotton is also increasing dramatically. Therefore, it is necessity to look for new renewable raw materials for textile fibre production. Bamboo has been identified as a more eco-friendly crop due to its fast growth rate, excellent carbon sequestration activity, needs for little water and no pesticides to grow. However, the current commercial manufacturing process of bamboo fibres uses large quantities of harmful chemicals and hence it is questionable if bamboo textiles are considered as

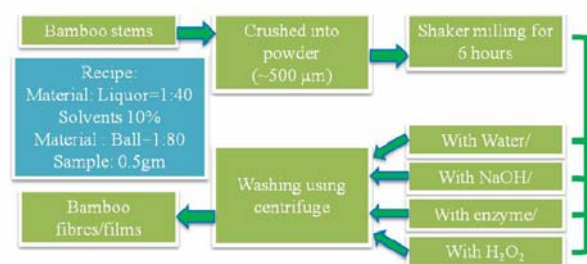
"green" products. Therefore, there is a strong need for developing a new method to produce textile fibres from raw bamboo plants in a more eco-friendly manner.

In our recent research, the origin of the novel properties of bamboo such as UV screening and antibacterial functions was identified as the aromatic chemical components of lignin. However, in the current commercial manufacturing methods, raw bamboo plants are dissolved in chemicals to collect the cellulose rich substance and the functional chemical component activity of lignin is lost during the process, so that the resulting fibres cannot retain the unique properties of raw bamboo.

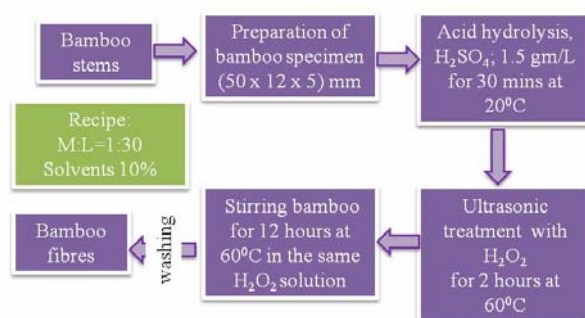
In this study, new manufacturing methods were investigated to process raw bamboo plants into fibres while retaining the lignin which contributes to the UV screening property of raw bamboo in the final fibres, with special emphasis on the environmental impact of the manufacturing method from the viewpoint of processing chemicals and by-products.



Production process of bamboo fibres using ultrasound with various reagents.



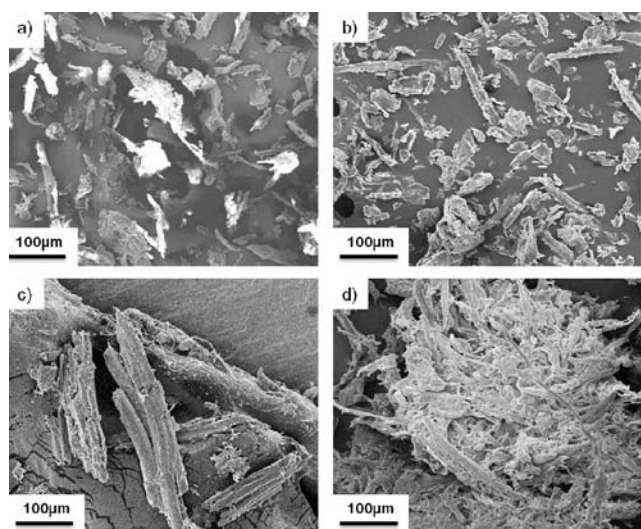
Production process of bamboo fibres using milling with various reagents.



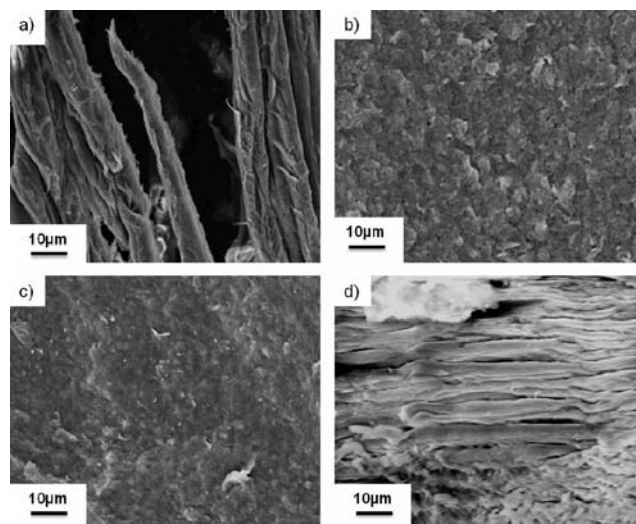
Production process of bamboo fibres using acid hydrolysis and ultrasound with various reagents.

Bamboo contains bast or ligno-cellulosic fibres and, considered as natural nanocomposites, where cellulose nanofibrils are embedded in the matrix of lignin and hemicelluloses. The stem of bamboo has only basic tissues and vascular ramifications but no xylem and phloem. The vascular bundles are embedded in the parenchyma ground tissue located in the culm. The vascular bundles are composed of two metaxylem vessels, protoxylem, phloem with sieve tubes and companion cells fibres. Usually a culm consists of 52 mass % parenchyma, 40 mass % fibres and 8 mass% conducting tissue. However, the amount of the fibres are 60-70 wt% of total bamboo stem. The fibres are multi-layered with variable length. The lignification of fibre cell walls occurs even prior to the end of internode elongation. Due to the presence of a high amount of lignin (approximately 28 wt% using the Chinese Standard GB5889-86) in the middle lamella and high mechanical strength due to the alteration in the orientation of cellulose microfibrils, it is difficult to separate the fibres from each other. To overcome this problem, in this study, mechanical and thermo-chemical approaches such as ultrasonication, shaker milling and boiling with continuous stirring were investigated. Ultrasonic treatment has been recently identified as an eco-friendly method in textile fibre processing. Mild solvents such as enzymes and water were also used to aid the fibre processing.

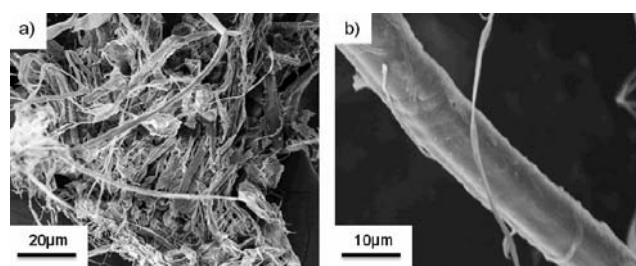
For the experimental work, six year old, dried matured bamboo (*Phyllostachys pubescens*) plant samples were purchased from Earthcare Farm at Crystal Waters Permaculture Village of Queensland, Australia.



SEM images of bamboo samples a) before ultrasonic treatment b) after ultrasonic treatment with NaOH c) after ultrasonic treatment with H₂O₂ d) after ultrasonic treatment with enzyme.



SEM images of bamboo samples after shaker milling with a) water b) NaOH c) H₂O₂ and d) enzyme.



SEM images of a) the processed fibres b) single fibre after combination of acid hydrolysis and ultrasonic treatment.

This article describes several approaches to produce natural bamboo fibres from raw bamboo plants by means of ultra-sonication, shaker milling and combined acid hydrolysis and ultra-sonication. It was found that ultra-sonication was not sufficient to process bamboo into fibres even with the aid of chemicals such as NaOH. The effect of shaker milling (high energy ball milling) was studied for the first time to process a ligno-cellulosic material into fibres and it was found that raw bamboo plants could be processed into fibres only with the aid of water and mechanical forces. The combination of mild acid hydrolysis and H₂O₂ treatment gave more separated fibres with a better appearance (whiter in colour) than the other two methods.

All of the processed bamboo showed significantly higher UV blocking ability than cotton. The process optimisation and spinnability study of the processed fibres are currently on-going. The effect of these processes on parenchyma cells and vessel elements is a subject of further study.

The bamboo fibres produced using the newly developed methods would be useful to produce natural textiles that have high UV screening abilities.

The authors would like to thank Dr Keith Millington at CSIRO Materials Science and Engineering for his

kind assistance on UV-Vis spectroscopy and Dr Chris Hurren at the Centre for Material and Fibre Innovation, Deakin University for the technical support.

1. Tarannum Afrin is a BSA member and PhD student at the Centre for Material and Fibre Innovation, Deakin University, Locked Bag 20000, Geelong, Australia, taf@deakin.edu.au

Letter from Di Hill¹ to the BSA – April, 2012.

I am a resident of Wynnum, and involved in a number of community organisations. I do not have a bamboo business, though one day would like to think I could write a book about bamboo - have already written something for my final subject for my Master of Arts.

Clearly I have a passion for bamboo - and find it extra ordinary how little knowledge there is on it by the general public.

My research (limited) has shown that there are people who are "scared" of bamboo and the rampant growth that they have heard about from some quarters, but I am now gaining a "following" of people who are taking an interest in various aspects of bamboo.

I met with a member of Brisbane City Council staff - I think her department is called "Habitat" who was scathing when my friend mentioned bamboo, and she said, "We are only interested in vegetation native to Australia" - when I told her that I was aware of three bamboo species native to Australia, I was told that at university she was told that there were none native to Australia. I have sent her some information.

I'd love to see the Bamboo Society produce a brochure with general factual information about bamboo.

I do suspect that what I am doing, for no financial reward, will be beneficial to those people promoting and selling bamboo products, and I'd love some communication/support from the society.

I am also working with a community organisation - Bayside South Development Forum, Inc and we are interested in putting on a Bamboo Festival late in September. Is there any way in which the Bamboo Society can assist us?

Bayside South Development Forum Inc, is a 12 year old community organisation working in the area which includes Wynnum, Manly, Port of Brisbane, Tingalpa Belmont, Lota, Murrarie. You can find some info at baysidesouth.blogspot.com.au

Other community organisations we expect will be involved in the Bamboo Festival are the very active Wynnum and Districts Chamber of Commerce, the Manly Village Chamber of Commerce, the Wynnum Community Centre and the Wynnum/Manly Community Garden - and we are hopeful of funding from Brisbane City Council, and perhaps some local 'corporates',

The Wynnum Central School has just been sold to the Brisbane City Council and will be the community hub so we are expecting that this will be the venue for some of the activities, but again, until after the local government elections decisions are pending on its use.

Our aim would not to be 'too big' this time - but to increase awareness of the sustainability of bamboo, to celebrate bamboo and explore the many uses of bamboo.

The community has organised festivals in the past and recognising the short lead up time if we are to achieve something worthwhile for 2012, we do not plan to be too big - if we can have some events over the weekend .e.g. markets, speakers in local venues, some community involvement (e.g. kites, or scarecrows), and perhaps a display either in a (vacant) shop in Wynnum of various products made of bamboo but available locally.

1. Di Hill: PO Box 3500, Tingalpa DC, 4173. Australia, Ph 0411 099 848
Bamboo Journey Blog - <http://tinyurl.com/75ess4x>

Evolution of the Harmonica – article and pictures, Bob Lipinski

Affectionately referred to as a "tin sandwich" by players and fans, the humble modern harmonica had it's origin in the small workshops of German instrument makers of the early 19th century.

The inspiration for this mass produced but hand assembled free reed instrument has been traced to the Chinese sheng, a mouth blown instrument consisting of free bamboo reeds in vertical bamboo pipes attached to a gourd wind chamber.

The sheng is one of the oldest Chinese musical instruments with images depicting it's use as far back as 1100 BC. Still in use, it's one of the main instruments in kunqu and other forms of Chinese opera.

The sheng was brought to Europe by mid 18th century where it joined other similar recently designed instruments.



In its simplest configuration, the German diatonic harmonica has changed little in basic design. Consisting of 3 components: metal coverplates, brass reedplates and wooded comb, this instrument has travelled a musical journey encompassing folk, blues, country, rock and even jazz.



Circa 1937 (back view)

Unlike a finely made stringed instrument, the harmonica doesn't usually age well. Its ephemeral nature is caused by the effects of corrosion, metal fatigue and warping and cracking of wooden combs due to moisture.

Players have traditionally accepted this and taken comfort in the relatively low replacement cost. Significant development has occurred over recent years thanks to the work of customizers and players who set out to improve the playability of the instrument. The Hohner Marine Band # 1896, as the model of choice for generations of serious blues harmonica players, has been the favoured model of customizers.



Crossover (back view)

Customizer / player Joe Filisko from Chicago pioneered technical modifications that greatly improved reed set and action, compression, note bending and sound projection. His modified Marine Bands have been much sought after by serious players and his technical procedures much copied. The Hohner company was so impressed (or maybe embarrassed !) that it hired Joe Filisko and virtuoso player Howard Levy to consult in the development of a new high performance Marine Band.



Mar

ine Band 1937



Marine Band Crossover

So we have the birth of the Marine Band Crossover, featuring stainless steel opened back coverplates, screwed down reedplates, new reed profiles and reduced tolerances between reeds and reedplates.

Most significantly, though, is the replacement of the traditional unsealed pearwood comb with a sealed comb of laminated bamboo.

After experimenting with other woods, plastics and composites, laminated bamboo was chosen for its stability and resonant properties. Its selection ensured the continuation of the distinctive Marine Band sound. Tonally, the Crossover is a little brighter and louder. From a player's point of view, it has taken out of the box harmonicas to new heights!

So, it's taken some time, but in the world of harmonicas, bamboo is back !

Carbon Credits in Bamboo and Bamboo Products

edited by Geoff Kyle

In an age where there is a real fear – and some evidence - that human activity is altering global climate, one could hardly be surprised by governments creating schemes to deal with the immediate consequences – if ignoring the causes – of the perceived threat to human culture. Business, of course, is free to identify marketing opportunities in an economy where carbon is a commodity in trade. And, as always accompanies actual or looming social disruption, there is no shortage of recycled and new “natural ways” by following which we all might live on a healthy planet in an harmonic equilibrium with the ten thousand things.

One example of the last-mentioned is the controversy over bamboo textiles and rayon. That topic has been addressed in previous issues and makes another appearance elsewhere in this issue. In relation to the newly-founded carbon market, there has in recent times, been a deal of vigorous discussion in academia, among agricultural interests, and in internet groups, on the subject of carbon credits as those apply to bamboo and bamboo products. In this issue of the Bamboo Bulletin, we try to present a representative selection of the many competing views, so that readers can have the facts available to them if they want to form their own opinion.

The base case is summarised by INBAR in a 2010 illustrated and very accessible presentation on the topic which details the facts and figures in the context of a generalised market. How that applies to particular markets in countries whose government schemes differ is not discussed in any depth. The INBAR report can be found at <http://tinyurl.com/2fmuxg6>

Jean Emmanuel Ndzana, a scholar at the Hamburg Technical University, noted a number of unproven claims in some of the proposals that had drawn on the INBAR report for inspiration, and identified a degree of unrealistic expectation on the part of bamboo carbon credit proponents. Ndzana agreed to contribute a paper to the discussion. The paper is reproduced in full for this article.

On the internet forum Bamboo Plantations, there was some support for and disagreement with the views of INBAR and J.E. Ndzana. In the following pages, Yannick Kuehl, Raimund Duking and Robert Roark provide comment.

Another valuable and useful reference is to be found in Bamboo Science and Culture, the Journal of The

American Bamboo Society, Number 24. See .
<http://tinyurl.com/7hblooe>

The questionable ability of bamboo towards carbon dioxide (CO₂) sequestration, wood supply and reforestation

by Jean Emmanuel Ndzana¹

Introduction

The interest on bamboo as renewable resource has increased in the recent decades in all continents of the globe. Among the reasons is the acute demand for solutions to addressing current environmental threads. Because bamboo grows rapidly and is regenerative resource, it is often mentioned as candidate to environmental concerns, namely carbon dioxide (CO₂)-fixation, wood supply and reforestation.

This short paper brings in clarity and insights by highlighting misunderstandings going on within the bamboo scientific community concerning the current discussed subjects of bamboo towards CO₂ sequestration, wood supply and reforestation.

Bamboo towards CO₂ sequestration

In most papers linking to environmental protection, bamboo is reported as an efficient carbon sink; (Jones et. al. 1992; Isagi 1994) mentioned bamboo plantations as net sink for global CO₂. In his book (Maoyi 2007) expressed similar statement; bamboo forest biomass stores a large quantity of carbon. “Carbon fixation” is the expression used by (Zhou et. al. 2005) for the same purpose. Because of its fast growth some other sources estimate CO₂-fixation by bamboo greater than that of wood trees: at (INBAR Website 2011) it is mentioned the following: Bamboo has several advantages over tree species in terms of sustainability and carbon fixing capacity. However evidence about these mentions is greatly lacking;

- None of the cited papers or source deals with the question scientifically,
- At time, none Institution worldwide is researching on the issue
- At the 8th World Bamboo Congress (WBC) in Bangkok 2009 –the World’s largest bamboo Event- neither a single paper nor presentation from the delegates did address the audience or show scientific results relating the question of CO₂-fixation by bamboo, although the Congress was entirely and expressly dedicated to environmental protection.

In turn, a number of scientific results collected from

multiple papers examining different questions argue the contrary at two basic levels: (i) By mass, bamboo biomass is not greater than that of woody trees, although bamboo grows faster: botanical and morphological arguments support this statement: Firstly wood volume and woody biomass levels are important indicators of the potential of forest to provide wood and to sequester carbon. A comparative analysis conducted on bamboo and woody trees over 20 years resulted to same biomass weight (Midmore 2009). Secondary the rhizome which is the sink for carbon sequestration is no larger than that of woody trees (Hunter and Wu 2002; Midmore 2009). Culms on average comprise 75-83% of total aboveground biomass, branches 12-15% and leaves 5-7%. On an annual basis, aboveground culm growth rates (fresh weight) of 10–30 t/ha/year have been reported (Kleinhenz and Midmore 2001), which is in line with those of woody species (Hunter and Wu 2002). The rhizome therefore is an important sink for sequestered carbon but, according to (Hunter and Wu 2002); this sink is no larger than that of woody trees. (ii) The stored carbon in bamboo tissues is susceptible to releasing, especially after bamboo flowering: (Liese 2009) observed that after carbon is stored in bamboo, it is released afterwards when bamboo decomposes and dies naturally or when bamboo is burnt. Natural decomposition is increased by the gregarious phenomenon. Therefore as general rule locking carbon up in soil makes more sense than storing it in plants and trees (Lehmann 2007). In the soil carbon is stored indefinitely and removed from the carbon cycle.



CO₂ is sequestered through photosynthetic activity on bamboo leaves. Here a young shoot of *P. propinqua* not active yet in CO₂ sequestration. Image by the author.

When looking at the total mass of carbon sequestration by plants, taking in account that the world's bamboo stands represent roughly 1% of the globe total forest area, it is reasonable by extrapolation to state that bamboo currently contribute roughly 1% in CO₂-fixation on the globe.

Furthermore, since carbon is stored in plant tissues in above and underground biomass, and taking in consideration that the chemical composition of bamboo is similar to that of woody trees, evidence of more fixation of CO₂ by bamboo than trees remains therefore questionable. Additionally, the fact that bamboo is a C₃-plant similarly to most trees, does not give indication on greater CO₂-fixation than other trees (Scurlock et. al. 2000). Consequently, it can be rather stated with (Midmore 2009) that bamboo does not sequester more carbon than any other tree species.

As conclusion to this aspect, the current mentioned ability of bamboo towards CO₂-fixation at global level is simply an exaggeration and likely to be propaganda.

Bamboo, wood supply and reforestation

Bamboo is often mentioned within the bamboo community as plant with potential to address deforestation and wood supply. Number of authors mentions its potential to replace timber from woody trees (Chaomao et. al. 2006; Febrianto et. al. 2010; Tomak et. al. 2011).

This often mentioned statement rather appears as an exaggeration; in a given situation (local level), bamboo can respond to specific land degradation or timber supply, but at present is far to replacing woody trees and wood supply, especially at global level: (i) Anatomically, bamboo biomass is not superior to woody trees; firstly the differences among genera are small and secondary the bamboo chemical composition exhibits no basic differences in comparison with wood (Liese 1992) in their main components cellulose, hemi-cellulose and lignin. In some specific utilization like sawn wood, the cavity inside the bamboo internodes can be a disadvantage to immediate utilization. (ii) The current global volume of bamboo is far to meet the demand of wood supply. Despite the lack of reliable data on world's bamboo biomass, the biomass production from the 1% current world's total bamboo stands (as mentioned earlier) will hardly catch up with the world's demand of wood currently produced from 40 billion ha of forest.

Further supportive reasons within the bamboo field include the followings; some regions of bamboo producing countries see their stocks decreasing because of mismanagement of stands. This justifies the increasing efforts devoted by number of International Organizations for bamboo biodiversity: UNEP for conservation, FAO for statistics through its periodic Forestry Paper on Global Forest Resources Assessment and INBAR for promotion.

Conclusion

Bamboo is a wonderful plant with great properties, namely –rapid growth and regenerative–, but these latter are not to exaggerate as it is so frequently the case. The ability of bamboo to fix more CO₂ than woody trees, supply wood and address deforestation at global level remains questionable. Bamboo plays a tremendous role in local communities, but its contribution relating global issues especially CO₂ sequestration, wood supply and reforestation remains insignificant, as the bamboo biomass which is the sink in these issues remains itself insignificant. If bamboo is to contribute at global level, the rate of planting must increase exponentially. The remaining question is therefore: can the bamboo community achieve such important rates of plantations?

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1. Jean Emmanuel Ndzana, M.Sc. is Researcher and PhD Candidate at the Hamburg University of Technology (TUHH). For the elaboration of this paper, the material was drawn from his not yet published PhD Thesis. As one Chapter of the Research Work focused on the utilization of biomass produced from the experimental work, a sub-chapter was devoted to the points discussed in this paper. Contact: ndzana.emmanuel@tuhh.de

Carbon Credits in Bamboo and Bamboo Products by Yannick Kuegl¹

[The contribution to this discussion made by J.E. Ndzana] touched upon a very relevant issue, the need for more research and data in the bamboo sector. However, I cannot agree with [his] conclusion with regard to bamboo's function in climate change mitigation. I would like to answer some of [those] points:

[Firstly], there are indeed institutions working on this issue. [Those are] listed in point 2. Other examples are:

The recent IMFN project "Mitigating Climate Change and Enhancing Livelihoods With Bamboo" in the Philippines, see: <http://tinyurl.com/cuzoh2f>

The world's first bamboo Carbon Offset Credits have been issued under the VCS scheme in South Africa: <http://tinyurl.com/cto3n2p>

The Pandastandard (see: www.pandastandard.org) developed a carbon sequestration methodology for bamboo projects

INBAR and partners (Zhejiang A&F University and the China Green Carbon Foundation) are currently finalizing a draft for a carbon accounting methodology for bamboo. Once the stakeholder consultation process is open we will highly welcome comments from this forum.

INBAR represents bamboo stakeholders at the UNFCCC COP meetings as an official observer since 2009.

[Secondly], there are indeed publications on the issue. We even have observed an increase of related publications in recent years. Here are some selected publications. Please note that not all of the publications conclude that bamboo outperforms trees in terms of carbon sequestration, but they all attribute an eligibility and unique role to bamboo in combating climate change.

Yen, T.M. & J.S. Lee (2011) Comparing aboveground carbon sequestration between moso bamboo (*Phyllostachys heterocycla*) and China fir (*Cunninghamia lanceolata*) forests based on the allometric model. *Forest Ecology and Management*, Vol. 261, No. 6, pp. 995-1002:

Conclusion: "Thus, moso bamboo is a superior species for carbon sequestration when compared with Chinese Fir".

LOBOVIKOV, M., D. SCHOENE and Y. LOU (2011) Bamboo in climate change and rural livelihoods. *Mitigation and Adaptation Strategies for Global Change* 2011:

Conclusion: "Bamboo's dimensions, woody biomass, C concentration, actual and potential global distribution, as well as socio-economic and environmental attributes earmark them for a role in climate change mitigation, adaptation and rural livelihoods".

Isagi, Y., T. Kawahara, K. Kamo & H. Ito (1997) Net production and carbon cycling in bamboo *Phyllostachys pubescens* stand. *Plant Ecology*, Vol. 130, pp.41-52:

Conclusion: "The above-ground net production of bamboo fell within the average range of productivity of forests under similar conditions".

FAO: The Poor man's carbon sink (see: <http://tinyurl.com/7f2vwo7>)

The Zhejiang A&F University studies bamboo and carbon sequestration for more than 10 years with more than scientific 60 publications on bamboo carbon sequestration in Chinese and English. These are critical publications reviewing the advantages and disadvantages of bamboo in carbon sequestration.

INBAR: Bamboo and Climate change mitigation
Bamboo Bulletin Vol 14 - Number 1

(see: <http://tinyurl.com/84vkq2r>). This publication argues that only under specific conditions bamboo can perform better in carbon sequestration than trees.

INBAR: The climate change challenge and bamboo (see: <http://tinyurl.com/76n77co>)

The New York Botanical Garden's magazine "Botanical Review" published a special issue (Volume 11 Number 3, Issued 15 September 2011) on Bamboo and Climate Change in China

[Thirdly, the] point that bamboo is "only" representing 1% of global forest area is not relevant. It is a fact that bamboo is highly relevant and important to rural communities, ecosystems and livelihoods – that is the important part. Moreover, a recent study estimated that the carbon pools in Chinese bamboo stands will increase by 40% (Chen, X.G., X.Q. Zhang, Y.P. Zhang, T. Booth & X. He (2009) Changes of carbon stocks in bamboo stands in China during 100 years. *Forest Ecology and Management*, Vol. 258, No. 7, pp. 1498-1496). This demonstrates that stakeholders have recognized bamboo's unique potential in combating climate change and started to use it accordingly.

I agree that bamboo cannot be generally labelled as per se "sequestering more carbon than trees". Bamboo is unique and has different characteristics than trees. However, bamboo can indeed be an efficient tool in climate change mitigation. Some of its advantages are:

Bamboo can grow on degraded lands (where trees would not grow)

Bamboo is highly renewable – so it can provide a sustainable and usable resource while sequestering and storing carbon. The recent decision of the UNFCCC to include HWP (harvested wood products) pools in the accounting mechanisms will allow bamboo stakeholders to utilize its benefits of renewability and usability, by continuously sequestering carbon in bamboo stands and storing carbon on durable products.

Bamboo can substitute timber products and, thus, can contribute to avoided deforestation

Bamboo still grows very fast, whether or not its growth is faster than trees depends on the species, climate and management

Bamboo can provide a sustainable and renewable energy resource

MAD challenge: as a renewable and versatile resource bamboo can simultaneously contribute to

climate change Mitigation and Adaptation while contributing to rural Development

So, concluding, I think bamboo deserves and holds a unique and special role in global efforts to combat climate change. Bamboo can be an effective tool in climate change mitigation – for that we need correct messages and reliable data. Therefore I agree that we should avoid unrealistic statements without scientific evidence. Moreover the bamboo sector would benefit from increased research activities.

1. Dr. Yannick Kuehl is a Forest and Climate change expert at INBAR. This material appeared as a post to Bamboo Plantations <http://tinyurl.com/yddldnx> Carbon Credits in Bamboo and Bamboo Products by Yannick Kuehl

Carbon Credits in Bamboo and Bamboo Products by Raimund Dükling¹

Do we agree that bamboo doesn't take a special position in mitigating climate change because of a supposed out-sized productivity? Do we agree that bamboo in this regard is comparable with trees? Do we agree that one will decide according to the circumstances on bamboo or trees?

[It has been written that] climate change actions generally do not target existing and standing biomass/carbon in forests. Are [we] sure that this is a matter of course? From many contributions in the bamboo plantations group, and in the grupo bambu-brazil, I received the impression that there are many misunderstandings regarding this matter. Please, upon which globally accepted definition [are the] objection[s] based?

In my opinion one must always make clear, if one is talking about (1) carbon storage in the ecosystem of a bamboo stand, (2) carbon storage in bamboo products, or, (3) sustainable bamboo stands as protection of old natural forests. If one doesn't make this differentiation the reasoning becomes confusing.

Let me quote some parts of the BS&C-article regarding carbon storage in bamboo products:

"A bamboo stand can only achieve a natural steady state between growth and decomposition if the culms are not constantly removed. However, a bamboo stand that is subject to regular harvesting will only become a true CO₂ sink if the carbon of the removed culms is stored in resulting bamboo products. ...

... The climatic effectiveness of bamboo products is dependent on the quantity of products, that can be

kept in circulation, from the initial production to the final decomposition, e.g. by incineration. There are a number of factors that influence the quantity of bamboo products, but the most important factor is the durability of the products. The lower the durability, the more frequently a bamboo product needs to be replaced in an existing pool of products. Increased product durability could lead to a considerable increase in the willingness of consumers to use bamboo products and therefore increase the product stock. However, bamboo does not have any innate biological defence mechanism and is easily attacked and destroyed by insects and fungi. The chemical protective measures that are frequently used to enhance durability often have environmental side effects (Liese and Kumar 2003, Liese and Dükling 2009).

The storage of carbon in bamboo products corresponds to the storage of carbon in the ecosystem. The size of the product pool, [with respect to] the carbon stock, is not determined by the rate of production, [in respect of] the carbon flux, as long as the loss through decomposition or incineration is equal to the production rate. Only an increase in product quantity with the same or increased residence time of carbon in the products can enlarge the carbon sink, (according to Körner 2009).

1. Raimund Dükling is the co-author, (with Johan Gielis and Walter Liese), of Carbon Flux and Carbon Stock in a Bamboo Stand and their Relevance for Mitigating Climate Change. See: Bamboo Science and Culture, the Journal of The American Bamboo Society, Number 24. <http://tinyurl.com/7hblooe>

Carbon Credits in Bamboo and Bamboo Products by Robert Roark¹

My understanding of the issue is that the total weight of "finished products" made of bamboo, is relatively minuscule, compared to the amount of such products made from other wood sources.

Meaningful carbon storage must account for a certain amount of atmospheric CO₂ for a relatively long period of time. I usually put "short term storage in wood products" at the low end of utility if it lasts for 100 years. That is too hard to monitor and the accounting is too theoretical to rely upon.

The preferred method of generating Carbon credits is to separate the C from biomass into an inert form, or into a gas that can be used without adding to the

atmospheric Carbon load. That makes sense, and can be profitable if the product is marketed as an alternative to chemical fertilizers or hydro carbon fuels.

The actual "Carbon Credit" revenues derived by the producer of certified CDM or VAS credit, will probably not cover the cost of production if the C is stored in the form of "wood products". In the future, most of the old wood buildings and all of the common wood products will probably be recycled within a relatively short time frame ... paper being the major example.

I don't think that we can expect to generate the majority of the income from our bamboo plantations from "Carbon Credits". I will try to [derive] a mathematical formula for estimating the effect of Carbon Credits on the cost of production and revenue from sales, if I can describe the problem in a concise statement ... are there any mathematicians among us who have figured this out?

1. Robert Roark is a prominent member of the American Bamboo Society whose interests and activities involve using bamboo to remediate waste water and disused waste land ... bamboo@grass@gmail.com

New Bamboo Charcoal Technologies Promise to Jump-Start Africa's Bioenergy Sector, Slow Deforestation and Fight Climate Change from Fu Jinhe at INBAR¹

Bamboo, a plant not often associated with Africa, may be the key to combating soil degradation and massive deforestation on the continent as an alternative source of energy.

A partnership among African nations and communities, the International Network for Bamboo and Rattan (INBAR) and China are working to substitute bamboo charcoal and firewood for forest wood on which 80 percent of the rural population in sub-Saharan Africa depends for its fuel needs.

Initial successes with bamboo charcoal in Ethiopia and Ghana, which have put bamboo biomass at the center of renewable energy policies, are spurring interest in countries across the continent and prompting calls for greater investment in bamboo-based charcoal production as a 'green biofuel' that can fight deforestation and mitigate climate change.

"Bamboo, the perfect biomass grass, grows naturally across Africa and presents a viable, cleaner and sustainable alternative to wood fuel," said Dr. J.

Coosje Hoogendoorn, Director General of INBAR at a side event at UNFCCC COP17 in Durban today. "Without such an alternative, wood charcoal will remain the primary household energy source for decades to come--with disastrous consequences."

Burning wood also has a significant impact on the climate. Scientists predict that the burning of wood fuel by African households will release the equivalent of 6.7 billion tonnes of greenhouse gasses into the atmosphere by 2050, resulting in further climate change through clearing of tropical forests.

In terms of health, the burning of fuel wood claims the lives of an estimated 2 million people every year--mostly women and children--who inhale the smoke. Continued widespread indoor use of forest wood charcoal as a household fuel could cause 10 million premature deaths by 2030.

INBAR's Bamboo as Sustainable Biomass Energy initiative is the first to transfer bamboo charcoal technologies from China to sub-Saharan Africa to produce sustainable 'green biofuels' using locally available bamboo resources. Driven by growing concerns about energy, health and food security, and climate change, the initiative is funded by the European Union (EU) and the Common Fund for Commodities (CFC).

Saving Forests, Mitigating Climate Change. It takes seven to ten tons of raw wood to produce one ton of wood charcoal, making wood fuel collection an important driver of deforestation on a continent of nearly one billion people who have few alternative fuel sources.

"Ensuring food security in a changing climate is one of the major challenges of our era. It is well known that the destruction of forests has negative repercussions on livelihoods and sustainable agriculture as it feeds into a cycle of climate change, drought and poverty," said Dr. Patrick Verkooijen, Head Agriculture and Climate Change of the World Bank. "Feeding people in decades to come will require ingenuity and innovation to produce more food on less land in more sustainable ways".

Indeed, scientists believe that deforestation across the Horn of Africa has contributed to pervasive drought in the region. Years of tree-clearing, particularly in hard-hit Somalia, have eliminated fragile forests that stood as the last line of defense against the conversion of sparsely forested dry lands and pastures into useless desert, according to researchers from the Consultative Group on International Agricultural Research (CGIAR).

The International Energy Agency (IEA) predicts that

if business continues as usual, by 2030 biomass energy in sub-Saharan Africa will still account for about three-quarters of total residential energy, underscoring the urgency of coming up with a sustainable alternative biomass to replace wood.

Sub-Saharan Africa has over 2.75 million hectares of bamboo forest, equivalent to roughly 4 percent of the continent's total forest cover.

"Rural communities need access to sustainable approaches that will keep trees in the ground and the environment safe," said Professor Karanja M. Njoroge, Executive Director, Green Belt Movement. "Bamboo grows naturally across Africa's diverse landscapes, but unlike trees, it regrows after harvest and lends itself very well for energy plantations on degraded lands. We should put it to good use to provide clean energy for the continent."

"With further investment and policy reform, community kiln technologies could be up-scaled to reach thousands of communities in Ethiopia," said Melaku Tadesse, National Coordinator for Climate Change Unit at Ethiopia's Ministry of Agriculture. A number of African countries are pressing for development of their own bamboo charcoal industries to provide sustainable, affordable energy for growing populations.

Harnessing the Perfect Biomass Grass. Bamboo is one of the fastest-growing plants on the planet and produces large amounts of biomass, making it an ideal energy source. Tropical bamboos can be harvested after just three years, rather than the two to six decades needed to generate a timber forest.

The entire bamboo plant, including the stem, branch and its rhizome, can be used to produce charcoal, making it highly resource-efficient, with limited wastage. Its high heating value also makes it an efficient fuel.

Charcoal is made through the controlled burning of bamboo in kilns, whether traditional, metal, or brick. The technology is being adapted to produce larger quantities of charcoal to serve a larger number of rural and urban communities as well as to produce bamboo charcoal briquettes that are ideal for cooking because they burn longer and produce less smoke and air pollution than 'natural' charcoal.

China is a global leader in the production and use of bamboo charcoal. The sector is worth an estimated 1 USD billion a year and employs over 60,000 people in more than 1,000 businesses. Chinese partners, including the Nanjing Forestry University and WENZHAO Bamboo Charcoal Co., are helping to adapt equipment like brick kilns, grinders and

briquette machines, and hand tools, for bamboo charcoal and briquette production using local materials. Building on this momentum, the INBAR initiative is now transferring China's advanced bamboo charcoal technologies to sub-Saharan Africa.

In addition to charcoal, bamboo offers many new opportunities for income generation. It can be processed into a vast range of wood products, from floorboards to furniture and from charcoal to edible shoots. The world bamboo export was estimated at 1.6 USD billion in 2009, a decline of about 659 USD million from 2.2 USD billion 2008.

1. INBAR is an intergovernmental organization dedicated to reducing poverty, conserving the environment and creating fairer trade using bamboo and rattan. INBAR was established in 1997 and represents a growing number of member countries all over the world.

Growing a New Carbon Economy by Wadzy Wadsworth

Anything made from oil gas & coal seam gas - hydrocarbons - can be made from plants' carbohydrates. Carbon and cellulose are the most abundant renewable resource on the planet. And the most useful plants that grow the most cellulose and carbon are Bamboo and Hemp. Bamboo will give us up to 100 tons of Biomass per hectare per year, without cultivation, while hemp will give us up to 30 tons of biomass per hectare per year, with cultivation.

The Carbon Problem:

If humanity is to survive and thrive economically - and more importantly, socially - we will have to turn off the fossil fuel and mining industries within the next twenty or so years. If carbon levels go to 500 parts per million we are in very uncharted territory? So what happens when the oil & gold run out? Well it's not really an issue, as the planet will be well and truly stuffed long before we run out of fossil fuels.

The Carbon Solution:

All plants, when growing take up carbon from the atmosphere and return carbon to the atmosphere through photosynthesis, respiration and the rotting process. If we can intervene via pyrolysis in the rotting process we can vastly slow down carbon returning to the atmosphere for many thousands of years! This withdraws carbon from its natural cycle and in effect brings down carbon from the atmosphere while at the same time improving farm soils to grow more carbon!

What is Pyrolysis:

Simply put, it is the heating of organic or inorganic carbon based material that separates the gases and oils from the material and leaves stable carbon behind. In the case of organic material such as bamboo, it turns it into charcoal or the more sexy word Biochar. We all know how fast bamboo rots when left out in the elements. However when the bamboo is turned to Biochar it becomes very stable and can last in the soil for thousands of years.

Bamboo Biochar Workshops:

The bamboo Society has recently run a couple of bamboo Biochar workshops, one in Maleny run by Hans Erken and Paul Taylor, and one on the Patanga community near Bellingen run by Wadzy and Andrew Usher.



Main drum - test firing Photo - Olga Teisseyre

The participants at the Patanga workshop learned how to make a simple TLUD (Top Lift Updraft Gasifier) using 44 Gallon drums. We also visited the fabulous Bartok at Andrews place.

The Bellingen area shows great potential for establishing bamboo industries. Running bamboo is very common with some communities including Patanga paying thousands of dollars to have it removed. Unfortunately the asset right under the nose of communities is not been managed and fully utilized.



Construction from a 44 gal drum. Photo - Olga Teisseyre

Fibre Industry Regional Enterprises:

The bamboo and hemp industries are in their infancy in Australia and thanks to dedicated enthusiasts and growers both potential large scale industries could be ramped up. Many country towns would be revitalized if they changed their crop production to bamboo and hemp. In the cotton growing areas where large scale irrigation is practiced species such as *Bambusa oldhami* and *Dendrocalamus latiflorus* could be grown with intercropping of industrial hemp or even cotton until the bamboo gets into full production after five to seven years. Imagine all the people buying consumer goods made from farm grown crops. At the end of their life cycle they could be pyrolised and returned to the soil! A win for all the imaginative people and Mother Earth

The Bamboo Society:

I believe the Bamboo Society has an important role to play in the development of large scale bamboo plantations. One of the problems is that we don't have enough bamboo growing to ramp up the industry and we will need to import large amounts if we wanted to convert places like Cubby Station.

Grow More India:

The taboo subject of tissue culture, which many growers have had bad experience with will need to be discussed in the industry. My good friend Dr Bamboo Barathi from India has a tissue culture factory that produces one hundred thousand plants a week. I have purchased and used this bamboo on a treated sewage mop crop and carbon offset project that I did in the Maldives with very good results. Dr Bamboo is building power stations in India to run on bamboo! The laboratory at Growmore has an annual capacity to produce over 10 million tissue cultured plants depending on the plant species under production. The growing room at Growmore has Infrastructure to grow 2-3 Million plants at any given time. The laboratory has been accredited by the Australian Quarantine Inspection Service (AQIS) for exporting tissue culture plants free of media from India. Dr Bamboo's website is well worth a visit at www.growmorebiotech.com

Carbon Mop Cropping:

If we are to mop up excess carbon from the atmosphere bamboo and hemp will not only foot the bill but also they will revitalize rural communities and create badly needed rural jobs. I believe we could quickly develop large scale bamboo plantations with the help of my good friend Dr Bamboo. Lets hope for our sakes and the sakes of Mother Earth we can build the industries ASAP.

Energy from Biochar – A Waste Heat Engine by Wayne (Wadzy) Wadsworth¹ and Hans Erken², edited by Geoff Kyle

The Bamboo Bulletin has presented several articles that dealt with bamboo charcoal, or bio-char, as it is sometimes called. Those have been a combination of DIY experimental efforts that evolved into useful devices which produced the goods on a very local scale, and a scaled-up industrial/agricultural version that uses the charcoal principle.

Wadzy takes the view that, "We can't change the past, but we can design and build a sustainable future". Producing energy from waste material provides wealth that cannot be measured only in dollar terms. Wadzy's motto of "Waste to Wealth" refers more to the abundant riches shared with the planet on all who live on it than to a personal accumulation of the once mighty dollar. Hans, of course, is well-known to Bamboo Bulletin Readers for his experimental "biscuit tin" charcoal rigs that use bamboo as fuel.

Wadzy and Hans decided that there was a need for a machine that could capture the energy liberated by controlled combustion of organic material and provide that energy sustainably for multiple purposes. Being BSA members, both naturally thought of using bamboo as a feedstock. Rather than re-invent the wheel, they identified a machine that would seem to be made to order and suggested that readers might – or perhaps, should - be interested.

Wadzy also recommends the following references for those who want to pursue the subject:

Grasslands Australia <http://tinyurl.com/7dab7pd>
Waste to Wealth at <http://tinyurl.com/bl9fzqz>
Four Corners at <http://tinyurl.com/cgzkx8s>

The following is an extract from promotional material presented by the manufacturer of the revolutionary new integration of machines that so impressed Hans and Wadzy.

See: <http://www.cyclonepower.com/>

Cyclone Power Technologies is the developer of an all-fuel, clean-tech engine with the power and versatility to run everything from waste energy electric generators and solar thermal systems to cars, trucks and locomotives. Invented by company founder and CEO Harry Schoell, the patented Cyclone Engine is an eco-friendly external combustion engine, ingeniously designed to achieve high thermal efficiencies through a compact heat-regenerative process, and to run on virtually any fuel - including bio-diesels, syngas or solar - while emitting fewer greenhouse gases and irritating

pollutants into the air.

Cyclone Power Technologies announced today that it has signed a Teaming Agreement with Enginuity Energy LLC, an innovator and manufacturer of biomass gasifiers. Under this agreement, the parties have joined forces to pursue government funding and commercial applications for distributed biomass-to-power systems that will utilize both companies' patented technologies.

By combining the technologies, expertise and commercial opportunities of Cyclone and Enginuity Energy, the Teaming Agreement is meant to support the development and advance the commercialization of a modular 35kWe to 250kWe biomass-to-power generation system. Enginuity Energy's patented, scalable Ecoremedy technology converts both high and low quality biomass (i.e., high moisture, high ash content) into thermal energy that can be used to power Cyclone Engines. The integrated system is expected to provide commercial, agricultural, industrial and governmental customers worldwide with an affordable solution for waste disposal and distributed renewable energy production.

Christopher Nelson, President of Cyclone, commented: "Forming synergistic partnerships with companies that can provide heat or fuel solutions from waste and renewable resources ... is one of the best uses for our compact external combustion engine."

David Mooney, President and CTO of Enginuity Energy, commented: "There is incredible demand for small-scale biomass systems that allow power to be produced on-site where the waste is created. These include farms, factories, hospitals, military bases and villages throughout the world.

Cyclone and Enginuity Energy hope to have a demonstration system operational by the end of the year, utilizing Cyclone's WHE-25 and Mark V engines, which are currently in late prototype stage.



Turning Up the Heat on Biochar in Northern Rivers NSW
Hands-on Biochar Workshop in Byron Bay, NSW, Australia, April, 2012.
by Paul Taylor¹

The second Annual Biochar Bootcamp was held on Apr 20-22, 2012, at Star Seed Gardens Nursery in Byron Bay. <http://starseedgardens.com> There were 24 registrants with Paul Taylor, Stephen Joseph and Dan Schreiber (our Starseed host) facilitating.

This workshop followed the well attended and successful workshop in Byron last year facilitated by Paul Anderson, Hugh McLaughlin and Paul Taylor and the March workshop in Maleny QLD by Paul Taylor and Hans Erken,

In the new workshop the emphasis shifted from making TLUDs or other Biochar ovens to focus on understanding how to make, test, and apply special Biochar mixtures to work in Australian soils.

Attendees were mainly people with an interest in farming and food growing, or with access to waste biomass, and included several repeat attendees from the past workshops.

An open to the public information evening on a rainy Friday night started with a slide show, The Biochar Revolution, by Dr. Taylor and a short presentation by Prof Joseph on his recent work in Vietnam and Nepal, followed by spirited Q&A.

Prof Joseph presented sessions on Saturday on Traditional Practices of Making Biochar, Properties of Biochar and Biochar Mineral Complexes, Making Composite Biochars with Bamboo, Biochar Aquaponics with Vermiculture, and Ideas for low emissions kilns with controllable temperature.



Loading the barrel – photo Hans

Participants broke into two groups, one to explore assembling and firing some new Biochar oven designs, the other to get hands-on in assembling mixtures of straw, clay, manure and minerals in bamboo to be fired in the new ovens. Sparks flying, recycled drums, mesh, metal plates and tubes were cut up and re-welded.

Materials required are: a 44 gallon/205 litre steel drum for the burner – 88x59 cm; a standard 70 litre steel drum for the after-burner chamber – 73x41 cm; 20 cm diam. stainless steel stovepipe as firebox with gate, pyrolysis tray with mesh bottom – 84x54x16 cm; perforated steel pipe, 10 cm diam. for afterburner air feed; and, stainless steel flue pipe, 14.5 cm diam. sleeved into afterburner flue.

The day ended with a Bamboo Feast, including fish curry cooked in bamboo on TLUD heaters, and marinated chicken wings on TLUD BBQ.

On Sunday morning the oven assemblers had a chance to make mixtures. Talented metal workers and welders remained focused on assembling the new oven, while others fired the composites in modified TLUDs and experimented with TLUD driven retorts.



Experimental Kiln nearly complete – Photo Hans

During the morning, the local media arrived to document the workshop.

<http://youtu.be/jGBVvj3rhgY>

At the end of the workshop participants went home with more understanding of how to:

- * make a simple biochar reactor
- * produce a range of different biochars at different temperatures
- * carry out basic tests on your biochars
- * make biochar/compost/mineral blends
- * understand the properties of different biochars
- * effectively apply biochar in different ways
- * use biochar in vermiponics, hydroponics and aquaponics for food growing

The new oven design was not finished in time to fire at the workshop, but was fired up by Paul in a test run on a rainy evening a week later. He reported "I thought it would be a failure with damp sticks for the firebox. I used a leaf blower to get it going and blast some initial heat up the chimney. I used 1/3 tray of dry bamboo, scrap wood blocks and maca shells for feedstock.

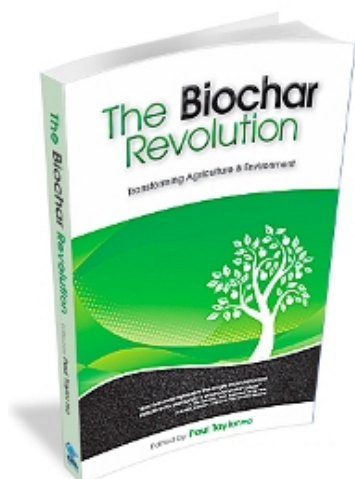
Surprisingly after only 30 mins I had a flare out the top of the chimney into the night. After another 30 mins I doused it all with water. Found a tray of char with no ash (although any ash formed may have been washed away)".

Workshop participants are invited back on May 20th to Paul's property for a hands-on event for discussion and potential refinement of the design, a couple of firings of the oven with various feedstocks and with thermocouples installed to monitor temperatures.

The outcome may be a design optimized for dual purpose biochar and pizza/bread oven. Just convert by swapping the pizza plate with a biochar tray!

After last year's Byron Bootcamp several individuals on the Northern Rivers of NSW set up to make biochar or biochar ovens. This year we hope to support garden and pot trials of composite biochars.

For additional information contact Paul Taylor, potaylor@bigpond.com



Some thoughts on biochar & bamboo by Hans Erken

After recently hosting a biochar bamboo workshop, actively participating in the Byron Bay workshop, reading everything I can on the subject and doing lots of cooking and experimenting, I am now fully hooked on biochar and enjoying every minute of it.

However, the more I get into biochar the more I realise that it is in some respects quite simple and in other ways hugely complex. As you see elsewhere in this issue, the finer points of bamboo biomass as compared to trees and carbon sequestration can be debated forever. Similarly, the properties of biochar and how it works also generate a lot of debate and much research is needed before we fully understand the dynamics. As Steven Joseph said at our recent workshop, biochar research needs the same amount of attention and money as does nuclear energy because it is just as important and every bit as complex.

Putting aside what we don't fully understand yet, here are some simple truths as I see it:

- * First and foremost, and the inspiration for the creation of, and research into biochar, is the fact that the Terra Preta soils of the Amazon are; extremely fertile and productive; they are man-made, it has been over 500 years since they were maintained by the civilisation that created them and the charcoal is still present and the soils remain fertile. No one can argue that these amazing soils deserve our fullest attention to try to learn how they work and how exactly they were created.

- * In the process of making biochar heat is produced. This heat can be utilised with quite simple devices for cooking or heating water in batches. With more sophisticated design it can run engines and generators large and small continuously.

- * The charcoal made from many organic materials including bamboo, is recalcitrant. That is, it resists biological decay and degradation and can survive in the soil for 1000s of years. This means that we can sequester carbon and reverse our direr global predicament by creating and burying biochar. The challenge is to work out how this can be done profitably.

With these facts in hand we can now add 'fuel' to the list of uses for our bamboo and it's a use that I am sure will become increasingly more important. I think that one of the best ways to use bamboo as a fuel is in the form of chips which are easy to handle,

compact to store, and very suited to be burnt in TLUDs, and TLUDS are easy to make and versatile.

To make bamboo chips we use shredders and bamboo is often thought of as being hard on shredders aka. chippers, the silica content is sited as causing the blades to blunt. In my experience the blades don't dull any faster chipping bamboo than wood. What does cause a problem is some species of bamboo breakup and go "stringy" the fibres wrap around the machine shafts and jam up the works. A recent realisation for me has been the fact that dry bamboo can be chipped much easier than green. It is more brittle and doesn't go stringy as readily. This is a huge discovery because it solves the other logistic problem of drying. When we chip green bamboo it starts to compost very quickly because of the nitrogen in the fresh leaves and the moisture. This decomposes the carbon which is not want we want if biochar is to be the end product.



In preparation for last year's bamboo construction workshop we cut culms that were left stand in the clump to cure and dry. This technique has been very successful because only one of the culms we used for the construction and a few other culms stored here there have been attacked by borers. It has been over a year now so I am quite happy with that result but back to biochar.

When I started to prepare fuels for the biochar workshop there were still culms cut for the construction workshop sitting in the clumps. The bamboo was dry and in good condition. It is so much easier to pull culms out of a clump and drag to a pile when they are dry and so much lighter. I then got contractors in with a big shredder that made short work of chipping the bamboo, covered it with plastic, and bingo, a pile of fuel. All the rain has made it difficult to keep dry but I have managed.



Smoked Bass

I think that burning, or more correctly, pyrolysing biomass just for the sake of making biochar is a waste so I have directed a lot of my attention to using the heat to cook. I have now developed some good designs for smoking and BBQing using stainless steel reactors made for stockpots and buckets, nested into 100 litre drums which serve as an outer cover for the fire and a stand for hotplates, woks or modified Weber kettles. I tell you, life is tough having to eat smoked Trout and char grilled yummys every second day in the interests of science and saving the planet.



Kevin & Gerry preparing lunch at the Maleny workshop

I am planning to have regular bamboo, biochar, BBQ events which will include a tour of our property, a demo of my TULD gasifier BBQ and other cookers and a meal. The meal will feature smoked and BBQed goodness with whatever shoots, spices, fruits and vegetables we have in season. If this sounds good to you, keep an eye on our website, hook up with me on Facebook or email me to find out when we have these events.

On our website www.earthcare.com.au I am continually adding Biochar content. I have added links to interesting and instructive videos & photos and we have for sale:

“The Biochar Revolution” a book published and co-authored by Paul Taylor. It contains 375 pages of biochar stories, information, instructions, diagrams, charts, new research and a resource section of suppliers and consultants. This is a must own if you have any interest in biochar or its benefits in agriculture, soil rejuvenation or in global warming issues.

We have stock of the ‘Champion’ TLUD stoves – a small, stainless steel, commercially produced stove and will soon have it listed for online, mail order sales.

If you live close enough to pick up, we have materials to make your own TLUDs including: 205, 100 & 20 litre drums, stove pipes, hotplates, grill plates and other bits & pieces.

The McConville Bamboo Curing Technique by Stuart McConville

I’ve been growing and using *D. latiflorus* and *D. asper* bamboo on my Northern NSW property for 10 years now, harvesting culms over two years old in the driest time of the year, using copper sulphate to purge them by standing them in a drum of 10% by weight solution and leaving them as long as possible. This technique worked but I found it cumbersome and difficult moving and standing the bamboo in the drums. One night the wind blew and a lot of bamboo fell over spilling my curing solution all over the place. I needed to find a better way and I called on my experience killing camphor laurels by drilling and filling and came up with the following technique, which after two consecutive harvests, appears to work extremely well.

Select the culms you wish to harvest by assessing the age of the Bamboo in the usual way, making sure that you have a bit of space around the base of the

bamboo to swing a cordless drill (it really helps if you’re working on a properly managed clump). Drill 8mm – 12mm (depending on the size of the bamboo) holes at the bottom of a section just above the node you will cut below to harvest. The holes should be offset above and below each other all the way around the base so as the vascular bundles in the bamboo are mostly all compromised. Then rasp off the holes so that the swarf from the drilling is removed and there is a smooth surface around the culm. Drill another hole in the top of the section, on an angle and large enough to get a small funnel into. Then simply glad wrap the holes you have drilled in the base of the section, sealing them off completely and fill the section with as much 10% by weight copper sulphate solution as you can fit in it. You’ll see the solution come out the holes and come into contact with the vascular bundles in the bamboo. From there on, let the bamboo continue to drink up the solution, topping it up again on day two. After a week or so, you can come back and observe the change in colour above the curing holes. When it has darkened sufficiently evenly enough, harvest the culm and lay it out to dry in the shade, turning regularly.



Hole drilled for filling with copper sulphate solution.

I’ve used a selection of similarly cured bamboo in a number of small building projects and as yet (the oldest is only a year) there is no sign of deterioration. Bamboo cured this way has a more even colour than the drum method. I believe it to have a better penetration of copper than my old technique. The

clumps do not appear to have suffered for the copper, in fact I'm pretty sure not much of it finds its way down into the root system as the cure discoloration appears only above the holes. Using the McConville Cure, you can be sure that transpiration processes will continue for as long as possible whilst curing takes place. After a direct cut and drum cure, the plant will go into shock pretty quickly and transpiration reduces to nil considerably. Using my cure, some vascular bundles will still be intact, the plant ought not shut down translocation of water and nutrients so quickly and it's possible to cure the culm over a longer time period, ensuring excellent penetration and maximum displacement of sugars.

My experimentation with this technique is still in its infancy, and I'd like to encourage others to try it and experiment too. If there is anyone out there who'd like to collaborate on a paper to explore the idea further, I'd be more than willing to discuss the possibilities.



Cured culms have an even colour.

Robert Saporito in Kakadu
edited by Geoff Kyle with images by Robert Saporito

Robert Saporito is the owner of Tropical Bamboo Nursery and Gardens and President of the Florida Caribbean Chapter of the American Bamboo Society.

<http://www.tropicalbamboo.com> Robert expressed a wish to visit Kakadu and see *Bambusa arnhemica* in the wild. Fortunately, both aims could be accommodated during his brief stay in the Northern Territory.



Wild *B. arnhemica* at Beatrice Hill.



Wild *B. arnhemica* at Beatrice Hill.

The most accessible wild stand of *B. arnhemica* in the Top End is located at Beatrice Hill on the floodplain of the Adelaide River – very near the infamous “Jumping Crocodile” tourist facility and the “Windows On The Wetlands” lookout. This is where optimistic farmers decided to grow flood rice in the 1950s. Unfortunately, magpie geese and other problems saw the rice disappear, yet the native bamboos planted as wind-breaks survive in places.



Wild *B. arnhemica* on the banks of the Adelaide River.

The extensive stand that Robert and his son visited is only a stone's throw off the Arnhem Highway and, though once fenced, access is not arduous. Over the years, this stand of protected native bamboos has suffered from the depredations of illegal harvesters. There have been prosecutions, but the location is distant from the towns, and not many people who have had any association with bamboo can understand why people bother to steal Arnhemica shoots. According to local folk lore, and personal experience, one cooks them like one cooks a galah – boil with a brick, discard liquor and galah, then eat the brick.



Not a new species. Rather, *B. arnhemica* in one of its alternative habits.

One interesting clump that Robert noted seemed to be a species other than *B. arnhemica*, and he wondered if it might be one of the other Australian native bamboos, perhaps *Mullerochloa moreheadiana*. The latter species is however, restricted to certain discrete areas in far northern Queensland, (See BB Vol.12, No.1), and has not been reported in the Northern Territory. Additionally, the work of Dr. Don Franklin and Jeremy Russell-Smith, shows that *B. arnhemica* exhibits rather different appearances in different locations. *B. arnhemica* was originally described in 1886 by F.J.H. von Mueller in regions around the Daly River and Holtze in NW Northern Territory. Von Mueller also reported another sighting on Cape York Peninsula, and this was once thought of as either a variant of *B. Arnhemica* or as another species. Following the work of Len Muller, it is now believed that the Cape York individual must have been *M. morheadiana*, (formerly *B. morheadiana*), and that the variants of *B. arnhemica* noted in rocky and up-gradient locations are resultant from its attempt to adapt to the local habitat.

The Kiwi Slammer¹ edited by Geoff Kyle

“The Slammer” is a comprehensive new take on a design principle that has already been successful in bamboo management. (See Ned Skroza in BB Vol.12, No.1, page 5.) Not only does it serve the purposes of bamboo shoot harvesters, it can manage with ease a great many other difficult tasks.

In addition to any value in the Slammer itself, its website is a joy to behold. Presented in a style reminiscent of 1960s Zap Comix, it tells the story of the tool's development and videos demonstrate many of its varied uses. There is also an hilarious video segment on safety and maintenance that would have made an appropriate inclusion in a John Cleese safety film. The proposed uses for time saved by using the Slammer is focussed on New Zealand and fly fishing, but I'm sure users with different tastes could manage to fill the time.



In homage to Diego Rivera or Robert Crumb?

The Slammer is a multi-purpose tool, a combination of a crowbar, axe, spade, mattock / grubber all in one. It was initially designed for removing bamboo but now is used for a huge variety of tasks saving time and money in labour intensive industries. The manufacturer claims it makes difficult tasks easier and enables the user to keep an upright position and good posture. It is especially useful for tight jobs where machinery cannot easily reach.

Made locally in New Zealand, the simple solid construction from high-tensile steel and bisalloy steel ensures a tool built to last and endure robust use. The

Slammer uses the downward force of the inner bar to slam the cutting blade through dense soil conditions, root systems associated with well-established plants and hard materials.

According to the manufacturer, over 1000 tools have been sold, mostly in New Zealand, but several have gone over to the other side of the ditch, [that is, to Australia – Ed], and all over the world.

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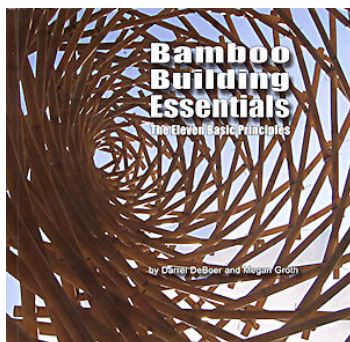
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Annual Membership Subscriptions fell due on 1st January 2012

If you are not financial this will be the last Bamboo Bulletin you will receive. If you are unsure of your membership status please send an email to the Treasurer, klang@earthcare.com.au or phone 07 54352858 See how to pay in next column.

"Bamboo Building Essentials" book available.



The BSA has a good stock of this book by Darryl DeBoer who was in Australia for the workshops we held in April 2011. The book has 110

pages, soft cover, and is chock full of photos of inspirational things to do with bamboo. Darryl's website has some good info also www.deboerarchitects.com Price is \$25 including postage. Email klang@earthcare.com.au

Bamboo Society Annual General Meeting 2012

This year the AGM will be held at the property of Jim Mahoney at Moorland, mid North Coast, NSW.

Date is Saturday 10 November. Please keep it free.

There will be further details closer to the day.

Membership Subscriptions for 2012 Fell Due on 1st January

The strength of the Bamboo Society of Australia lies in a strong and financial membership.

To continue publishing this Bamboo Bulletin, and undertake other projects, we need our membership numbers to remain at a good level.

We have three payment options available;

1. Good old fashioned cash, money order or personal cheque,
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**Photos of a recent trip in Vietnam
by Bob Lipinski. See Bob's story
about harmonicas on page 14.**





Bamboo is used for many structures at the Woodford Folk Festival, Queensland. 2011 - 2012

