



# **Bamboo Propagation and Plantations**

**World Bamboo Workshop  
Phu An Bamboo Village, Vietnam**

**September 18, 2022**





# From Belgium to Indonesia to BAMBOO



BELGIUM



Headquarters of Bell Telephone Mfg Co, Antwerp Belgium, and birthplace of the Metacocta 10 C system.



Maintenance

Operator room

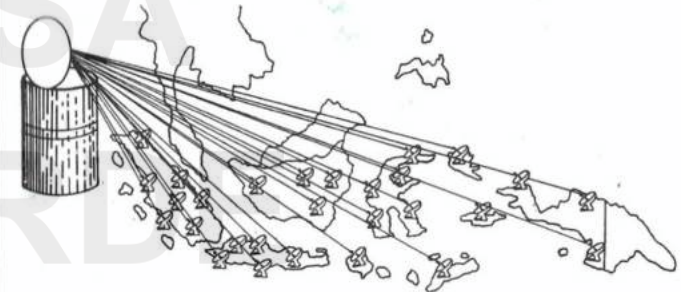


The Metacocta 10 C central processor unit, the powerful heart of the Jakarta toll and international exchange.

Arrived in Jakarta on November 2, 1977



## PALAPA SATELLITE SYSTEM



In 2007 telecom activities stopped  
Try to go green and by  
April 2008 – I meet BAMBOO







# BAMBOO from BELGIUM



OPRINS Plant  
2008





Jan Oprins



Johan Gielis



Marc Peeters

(12) **United States Patent**  
Gielis et al.

(54) **MICROPRO AND GERM BAMBOOS** (10) Patent No.: **US 6,677,154 B2** (45) Date of Patent: **Jan. 13, 2004**

$$r(\varphi) = \left( \frac{\left| \cos\left(\frac{m\varphi}{4}\right) \right|^{n_1}}{a} + \frac{\left| \sin\left(\frac{m\varphi}{4}\right) \right|^{n_2}}{b} \right)^{-\frac{1}{n_3}}$$

Super-formula

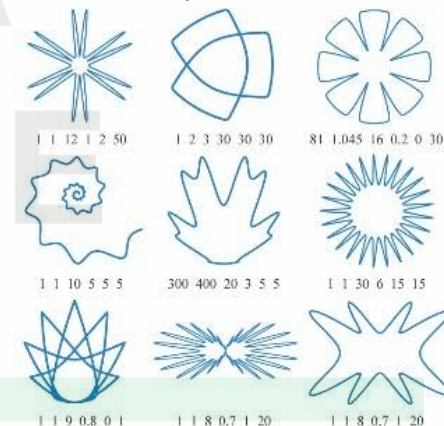
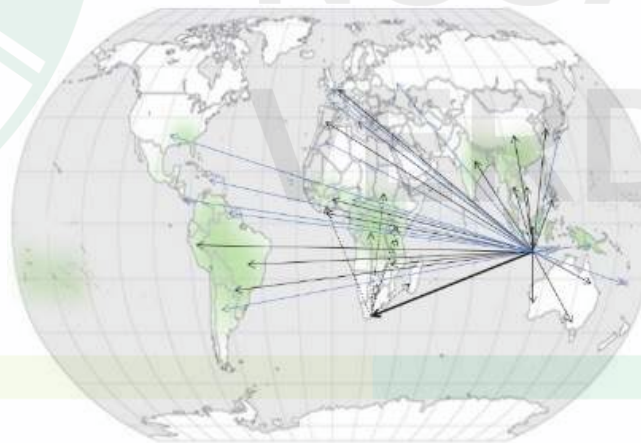


Fig. 1. Examples of super-shapes obtained by the super-formula (1). Their corresponding a, b, m, n<sub>1</sub>, n<sub>2</sub>, n<sub>3</sub> are shown under each shape respectively.

**BBiT®** first developed and used in Belgium; transferred to Indonesia for further development for tropical & semi-tropical bamboo species.

In total have been more than **25.000.000 tissue cultured bamboos been made**, since the **BBiT®** protocols made by Jan Oprins & Johan Gielis (Patent 2004), and been distributed all over the World.



# Intellectual Property

Products of Indonesian Content : 100%



- **BBiT** : **Bambu BioTechnology** = process of making bamboo with Tissue Culture.
- **BNV** : **Bambu Nusa Verde** = owning the *BBiT* technology as well as the plantlets.



Applicant's Name	: REGENT OF SLEMAN
Address	: Jl. Parasmya, Beran Lor, Tridadi, S
Registration Acceptance Date	: August 12, 2021
Plant Type	: Bamboo
Variety Name	: Sembada Verde



Registered Variety Protection for  
*Dendrocalamus asper* –  
**Sembada Verde**

Both are IP registered since 2021.

# OUR LOCATION



Jl Boyong 13, Tebonan,  
Harjobinangun, Pakem,  
Sleman, Yogyakarta



Function	m2
Laboratory	700
Greenhouse	2,000
Quarantine/closed Nur.	3,300
Nursery	12,750
Guest house & office	250
Idle land	350
<b>Total m2</b>	<b>19,350</b>

Other location: trial planting 10.000m2





- Sterile infrastructure, production room with 13 laminar - capacity 1m+ plants/year
- Growth room: temperature, humidity, light controlled
- Medium sterilization and manufacturing equipment
- Highest purity water filtration system





# NURSERY



Greenhouses and closed nurseries: 7

- Hardening of the plants, in tunnels
- Spraying and fertilizing installation
- Capacity 300,000+ plants

Open nurseries: 3

- Spraying and fertilizing installation
- Capacity 500,000+ plants
- Bamboo is ready to be planted in the field





# Mother Plants & Initiation



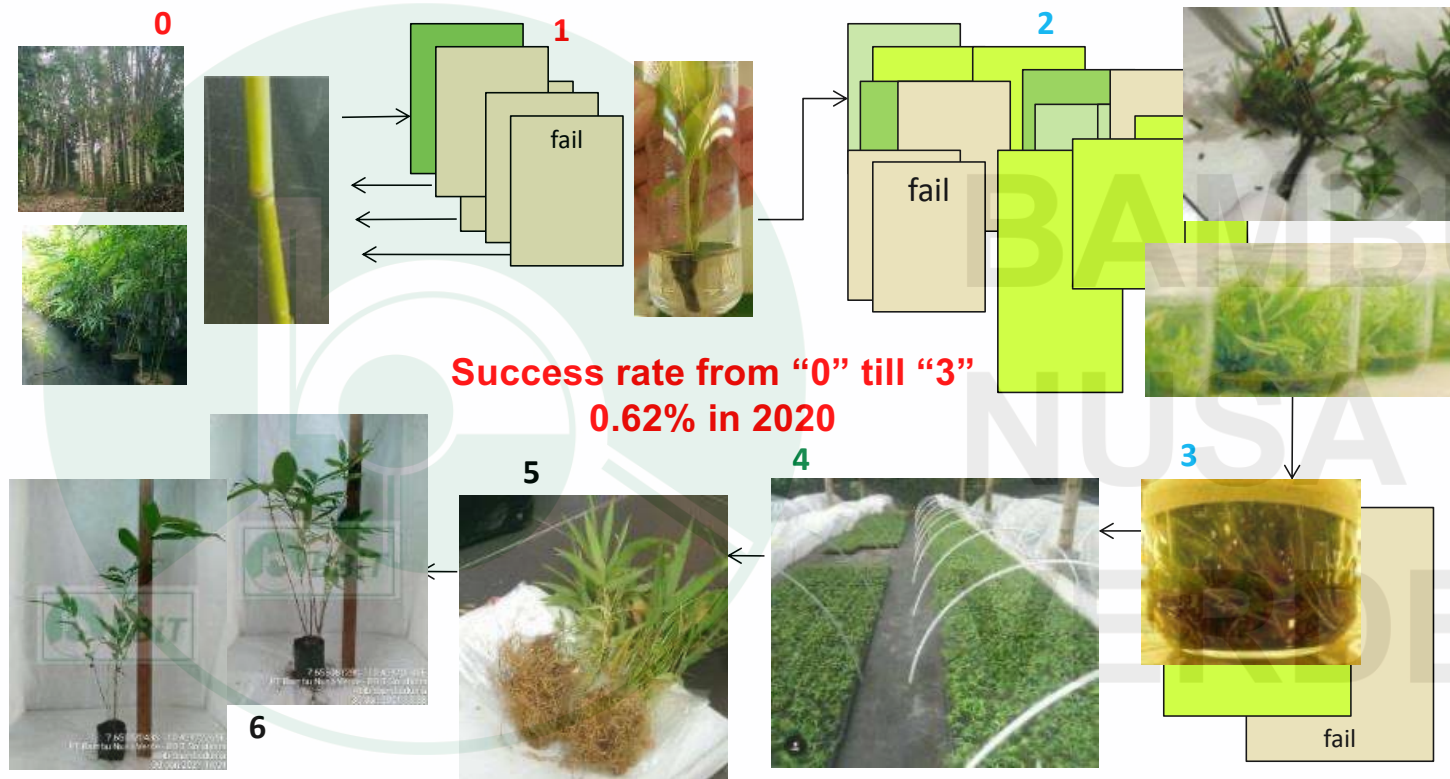
OVERVIEW	Qty	%	Total species		Production – 2021	
Industrial bamboo	85	46%	24	34%	9	36%
Ornamental Bamboo	48	26%	30	42%	9	36%
Industri & Ornamental	50	27%	18	24%	7	28%
<b>Total</b>	<b>183</b>	<b>100%</b>	<b>72</b>	<b>100%</b>	<b>25</b>	<b>100%</b>

2020	Qty	%
Total clone initiated	961	
Total ex-plants used	19,504	
Sterile – Stage 1	1,451	7.44%
<b>Clones to production</b>	<b>6</b>	<b>0.62%</b>

*Continuous ongoing R&D to improve*



# Tissue Culture Process



Success rate from "0" till "3"  
0.62% in 2020

**Pre-laboratory** – pre-tissue culture stage  
"0": Preparation, selection of bamboo species, collection of branch book cuttings, preparation of in vitro culture.

**Laboratory** – tissue culture process, temperature and humidity controlled

"1": Initiation, sterilization of explants

"2": Tissue culture propagation with multiplication, genetically controlled process, simulation of branching growth

"3": Rooting: genetically controlled process, stimulation of root formation.

**Greenhouse** – acclimatization room:

"4": Transplanting to greenhouse, reinforcement in tray under acclimatization tunnel, controlled temperature and humidity.

"5" Grown in trays/plugs (30 cm).  
Transfer to nursery or final planting site.

**Nursery** – preparing plants before they are ready to be planted in the field:

"6": Nursery / ready to plant, Transfer to poly-bag capacity of 1 liter.

Grown in polybags (min. 50 cm), ready for planting. Each polybag having 2 or more culms

## Risk stages

Extremely difficult: 0 & 1

Medium Risk: 4

Very difficult: 2 till 3

Low risk: 5 and 6

## Transport Plantlets

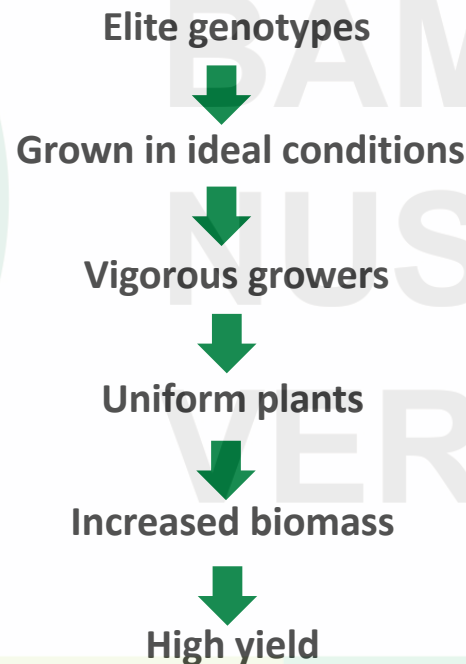
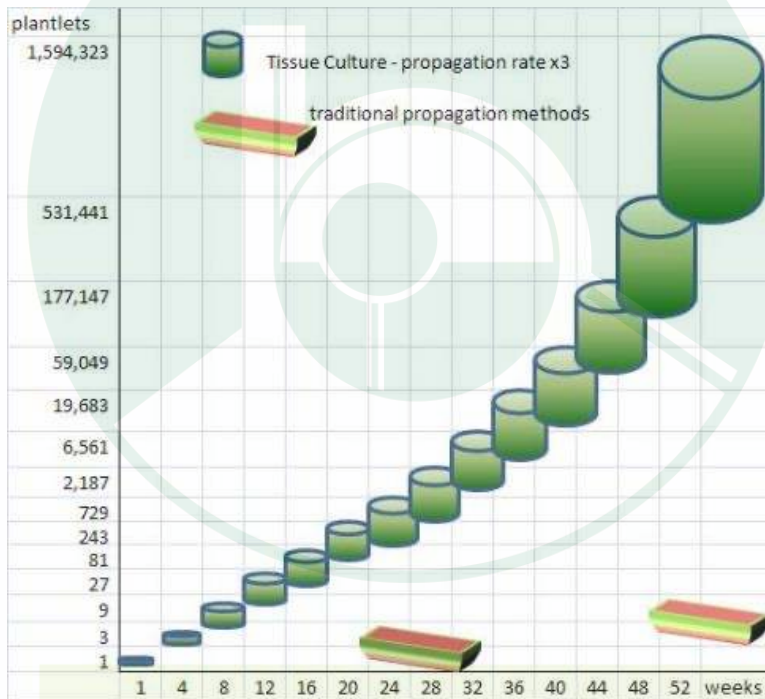
to remote location only in stage 5 & 6

(extensive root growth – multiple culms)



# Tissue Culture Benefits

Starting with 1 propagule thousands of plants can be made by TC in 1 year !  
 Traditional Propagation is very slow in comparison to Tissue Culture – 9 plant in 1 year



- Selection of mother plants: healthy, best growth, and young plants
- Grow-up sterile, free of virus and pests, making them strong
- Multiplication or propagation is big
- Root development is stimulated during TC process and makes superior root development resulting in vigorous growth in field
- Plantlets small, compact size for packing, transport and planting
- Make early clump formation, uniform in size and yield
- Best market value compared to other types of bamboo multiplications
- **Large quantities can be provided at a well-defined time**



# BBiT Model Plants




*Dendrocalamus asper* (Schult.f.) Backer ex Heyne

## BAMBU PETUNG

Clone: BT.P2

Giant bamboo, sweet bamboo (E)  
Bulu botung (Bat.); oloh otong (Gayo); triëng bëtung (Aceh);  
léwuo guru (Nias); përing bëtung (Lamp.); awi bitung (Sd.);  
pring pëtung (I.w.); përéng pëtong (Md.); tiing pëtung (Bl.);  
bulo patong (Mak.); awo pëtung (Bug.);  
bambu swanggi (Banda); betong (Flores, NTT)

Initiation: 24/10/2010  
Production: 12/01/2012  
Plant to greenhouse: 17/04/2013  
Tanam lahan: 06/05/2014





# Stock & Production

September 9, 2022

No	Species	Code	TOTAL
1	<i>Bambusa auriculata</i>	Auri	414
2	<i>Bambusa balcooa</i>	35	31,573
	<i>Bambusa balcooa</i>	35(0A)	3,851
	<i>Bambusa balcooa</i>	35(1)	18,769
	<i>Bambusa balcooa</i>	35(1A)	2,909
	<i>Bambusa balcooa</i> - TOTAL	35 xx	57,102
3	<i>Bambusa balcooa</i> var. <i>Capensis</i>	36	6,170
	<i>Bambusa balcooa</i> var. <i>Capensis</i>	36(3)	12,175
	<i>Bambusa balcooa</i> var. <i>Capensis</i>	36(4)	2,604
	<i>Bambusa balcooa</i> var. <i>Capensis</i>	37(1)	10,278
	<i>Bambusa balcooa</i> var. <i>Capensis</i>	37(1A)	291
	<i>Bambusa balcooa</i> var. <i>Capensis</i> -TOTAL	36/37xx	31,518
4	<i>Bambusa blumeana</i>	O2	4,442
	<i>Bambusa blumeana</i>	O3	4,581
	<i>Bambusa blumeana</i>	O3A	3,147
5	<i>Bambusa chungii</i> 'Barbellata'	CHB	1,030
6	<i>Bambusa eutuldoides</i> 'Viridi-vittata'	OV	506
7	<i>Bambusa heterostachya</i> (glaucophylla)	GP2	333
8	<i>Bambusa heterostachya</i>	HS	18
9	<i>Bambusa lako</i>	LK1	99
10	<i>Bambusa maculata</i>	BMT	10
11	<i>Bambusa multiplex</i> 'Shimadai'	30(0)	6,554
12	<i>Bambusa multiplex</i> 'Green Hedge'	31(0)	1,888
	<i>Bambusa multiplex</i> 'Green Hedge'	31(1)	50
13	<i>Bambusa multiplex</i> 'Alphonse Karr'	32	1,418
	<i>Bambusa multiplex</i> 'Alphonse Karr'	32(0)	700
14	<i>Bambusa multiplex</i> 'Fernleaf (small)'	33	780
15	<i>Bambusa multiplex</i> - 'Goldstripe'	34	40
16	<i>Bambusa oldhamii</i>	BA	2,680
17	<i>Bambusa textilis</i> 'Gracilis'	TG	1,046
18	<i>Bambusa tuldooides</i> (ventricosa)	VT(1)	50
	<i>Bambusa tuldooides</i> (ventricosa)	VT2	2,038
19	<i>Bambusa vulgaris</i> 'Vittata'	K7	270
	<i>Bambusa vulgaris</i> 'Vittata'	K2	1,122
	<i>Bambusa vulgaris</i> 'Vittata'	KL(1)	1,114

No	Species	Code	TOTAL
20	<i>Bambusa vulgaris</i> 'Vulgaris'	A	182
	<i>Bambusa vulgaris</i> 'Vulgaris'	A2	390
	<i>Bambusa vulgaris</i> 'Vulgaris'	A3	83
21	<i>Bambusa vulgaris</i> 'Wamin' - Buddha	WM1	180
	<i>Bambusa vulgaris</i> 'Wamin' - Buddha	WMT(1)	630
22	<i>Bambusa yunnanensis</i>	YNS	20
23	<i>Bambusa sp.</i> 'Longinternode'	Blg	536
24	<i>Dendrocalamus asper</i>	P(Bd)1	4,468
	<i>Dendrocalamus asper</i>	P(Bd)2	25,882
	<i>Dendrocalamus asper</i>	P2	543
	<i>Dendrocalamus asper</i>	P91(A)	940
	<i>Dendrocalamus asper</i>	P91(B)	19,152
	<i>Dendrocalamus asper</i>	P91(C)	22,544
	<i>Dendrocalamus asper</i>	P30	14,211
	<i>Dendrocalamus asper</i>	P92(A)	8,718
	<i>Dendrocalamus asper</i>	P92(B)	17,181
	<i>Dendrocalamus asper</i>	P92(C)	18,548
	<i>Dendrocalamus asper</i>	PL(T)	59
	<i>Dendrocalamus asper</i> - TOTAL	P xx	132,246
25	<i>Dendrocalamus asper</i> 'Thai'	PT2	100
26	<i>Dendrocalamus asper</i> 'Black'	PHTO	10
27	<i>Dendrocalamus brandisii</i>	ST_BDS	1,433
28	<i>Dendrocalamus giganteus</i>	11(S)	3,886
	<i>Dendrocalamus giganteus</i>	11(S)A	15,603
	<i>Dendrocalamus giganteus</i>	11(S)B	3,995
	<i>Dendrocalamus giganteus</i>	11(S)C	3,621
	<i>Dendrocalamus giganteus</i> - TOTAL	11-12(x)	27,105
29	<i>Dendrocalamus giganteus</i> var. <i>Latiflorus</i>	DGVL	178
30	<i>Dendrocalamus hamiltonii</i>	1(S)	3,376
31	<i>Dendrocalamus latiflorus</i>	DL2	20
32	<i>Dendrocalamus membranaceus</i>	15K	4,110
	<i>Dendrocalamus membranaceus</i>	15A	468
	<i>Dendrocalamus membranaceus</i>	15C	16
33	<i>Dendrocalamus minor</i> 'Amoenus'	Dma	688

No	Species	Code	TOTAL
34	<i>Gigantochloa apus</i>	S.DA	762
35	<i>Gigantochloa atroviolacea</i> (Java Black)	W0	1,213
36	<i>Gigantochloa atter</i>	LO	636
37	<i>Guadua amplexifolia</i>	126	870
38	<i>Guadua angustifolia</i>	GA	2,150
39	<i>Schizostachyum blumei</i>	W.GK	150
40	<i>Schizostachyum brachycladum</i> (yellow)	SBY	70
41	<i>Thyrsostachys siamensis</i>	Si	40
	Total	41	307,321
	Ornamental & Industry	12	10,871
	Ornamental	15	22,224
	Industry	14	274,226

Genus	Species	Clone
Bambusa	23	41
Dendrocalamus	10	24
Gigantochloa	3	3
Guadua	2	2
Schizostachyum	2	2
Thyrsostachys	1	1
Total	41	73

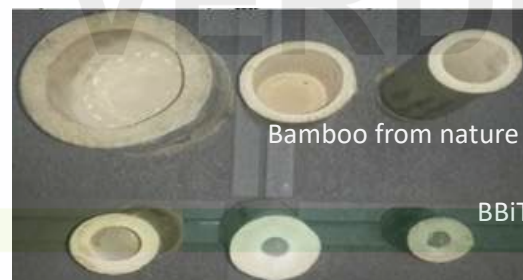
# Recommended Species



Multi purpose for building, ply-bamboo, biomass, pulp and paper, textile and charcoal ...

With the delivery is the SOP (Standard Operating Procedure) to handle the plants.

Remote assistance by on-line communicating for will be provide for planting & maintenance.



Survey to recommend Species & planting





# STEK (cutting) >< BBiT

cutting



BBiT



No	Propagation method	STEK	BBiT
1	Root size & system	1	5
2	New leaf and culm growth	2	5
3	Polybag size	4	4
4	Transportation for shipment	3	4
5	Longlivity if packed in box	3	5
6	Plantation soil suitability	3	5
7	Survival rate in the field	2	5
8	Endurance to drought	3	5
9	Growth rate in the field	3	5
Total score (max 45 points)		24	43







# Re-greening Gunung Batur, Bali



1<sup>st</sup> year - 2000



1<sup>st</sup> year



2<sup>nd</sup> year



3<sup>rd</sup> year



5<sup>th</sup> year



7<sup>th</sup> year







# Bamboo Plantation



## Jasinga, West Java



April 4, 2011



January 13, 2012



March 16, 2012



June 7, 2012



March 13, 2013



September 14, 2015

Plantation of 20 ha in Jasinga, Bogor – West Java – planted 2.5 x 8 meter = 500 clumps/ha

Species: *Dendrocalamus asper* ex TC/ BNV

Mixed with cassava and fertilizer applied – cassava harvested in March 2012 – well maintained

March 2013: harvesting the first culms for paper manufacturing – tall 6 meters, average 10-12 per clump







# Ex-mining Rehabilitation



Sangatta, Kalimantan Timur – PT Kaltim Prima Coal

Species: *B. balcooa*, *B. blumeana*, *B. vulgaris*, *B. tuldooides* - 2010

PT KALTIM PRIMA COAL



Status 2020



Nov 2021







# Rehabilitating Ex-mining



## PT Bukit Asam, Tanjung Enim

*Bambusa sp., Dendrocalamus sp., Gigantochloa sp., Guadua sp.*

## PT Amman Mineral Nusa Tenggara, West Sumbawa

*Bambusa vulgaris, Dendrocalamus asper, D. giganteus, D. hamiltonii*



Status January 2022; Planted February 2021



Nov 2021





# Bamboo Plantation



## Ketapang, West Kalimantan



Land before planting



Soil type dystrodept and quartzsammments



Delivery Sept - Dec 2014



Till early 2015



Land clearing



Planting Febr 2015



October 2015



Aug 2016







# Bamboo Plantation



## Ketapang, West Kalimantan



July 2017



2018



May 2020



October 2021



Species: *D. asper*, *B. balcoa*, *B. balcoa* var. *Capensis* – 2015 total 500+ha







# Bamboo Plantation



Siberut – The First Off-Grid Bamboo Power Plant in the World



Supply of 150k seedlings on 2017  
Every household get 100 bamboo

Status on 2021 (planted 2018)







# Bamboo Plantation - Malawi



Opened World Economic Forum Day, in Swiss, on February 25, 2019 - [youtube.com/watch?v=KKmLlozKf8E](https://www.youtube.com/watch?v=KKmLlozKf8E)



October 2015, after 9 months no rain the bamboo is brown and looks dead, but in March 2016 the rain comes and the bamboo is again green with new shoots  
200 ha – *D. asper*



<https://www.wri.org/insights/bamboo-malawis-unexpected-tool-climate-change-resilience>





# Africa



Ghana 2013



DR du Congo ex 20



Benin 2016



Tanzania 2016



Export to  
15 Countries



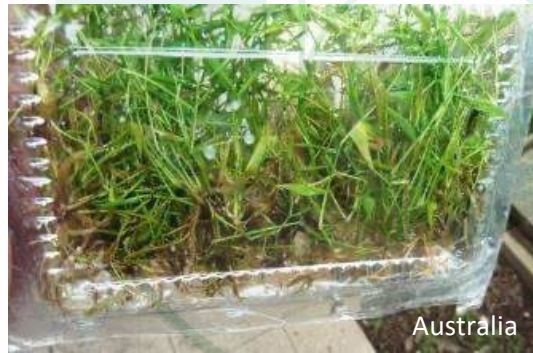
Nursery South Africa







# South America (3) – Australia – Asia (18) – Europa (3)





# Bamboo for Water Reservoir

To prevent erosion





# Preventing Erosion & Rehabilitating



**Table 5 : Runoff and soil loss under bamboo plantation**

Year	Age of the bamboo plantation (years)	Seasonal rainfall (mm)	Runoff from bamboo planted area (mm)	Runoff (%)	Soil loss (t ha <sup>-1</sup> yr <sup>-1</sup> )
2010	1 <sup>st</sup> year	456	44.00	9.65	4.27
2011	2 <sup>nd</sup> year	226	6.04	2.67	0.66
2012	3 <sup>rd</sup> year	531	14.50	2.73	0.78
2013	4 <sup>th</sup> year	494	8.96	1.81	0.60





# Packing based on size



Stage polybag  
In box or plastic - 300 per box  
pastic

Stage plug  
in plastic  
3500 per box for air transport

Ship by air or truck (7.500 polybag in plastic bag up to 18.000/truck)





# Unpacking and Maintenance



At location polybag with media for replanting before plantlets arrive



14 days after replanting in polybag



30 days replanting in polybag



Plug: 4 day in box till arrival in destination  
Greenhouse



Tray with media to be ready to plant the plug  
size - Replanting >10.000 plantlets/day



Remain in tunnel with temp and humidity  
controlled for 10 days

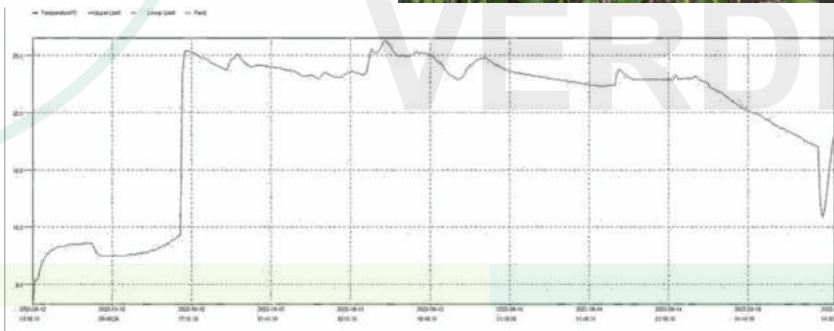




# Delivery in last month



Survival : 99+%



Export: 43.000 plugs  
Local: 10.000 polybag





# Process & Sizes & Planting

Action for ordering	Local	Export	BNV
Request stock available	X	X	x
Select species & quantity	X	X	----
Confirm availability	----	----	X
Confirm import requirements	----	X	----
Apply for Export Permit	----	----	X
Prepare shipment & PC	----	----	X
Pay before shipment	X	X	----
Ship transport ready			X



Fertilizing is **HIGHLY** recommended

Plantlet size	Local	Export	in box	Truck	Survive Transport	Recover & Grow	Ready to plant
Polybag - 80+ cm	X	----	250+	6000+	10 days	2 - 30 day/shadow	<30 day
Plugs 30 cm	X	X	3500+	----	5 days	Greenhouse/tray - polybag / nursery	6 month
Ex-vitro 8 cm	(x)	(x)	8000+	----	3 days	Greenhouse & Tunnels in Trays	9-12 month



# Utilization based on Culm Age

Yield is the key to the successful agricultural practices which is inseparable from plantation management

Age	Usage	Picture	Age	Usage	Picture
7-30 days	Edible shoot and fodder		2-3 years (late adult)	Furniture products and non-structural applications; paper and pulping	
1-12 months (juvenile)	Production of ropes and basketry (8 – 12 months old)		3-4 years (old age)	Structural applications, industrial products	
1-2 years (adult)	Basketry, mats		>4 years (advanced old age)	Too brittle (lack of elasticity)	



Different color marking or number to identify the age of the culm



Clear cut

Source: Manual for Sustainable Management of Clumping Bamboo Forest (INBAR 2019)

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# Collaboration



Dec 2009



Oct 2010



Aug 2011



Aug 2012



Jan 2010



Aug 2011



Oct 2011



Aug 2012 - 2018





# Collaboration



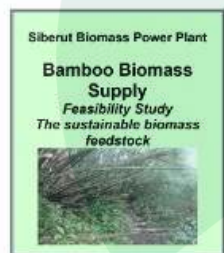
Indonesian univ.(3); Belgian univ. (3); Indon. Research Inst.(2); Small Scale Industry (4)



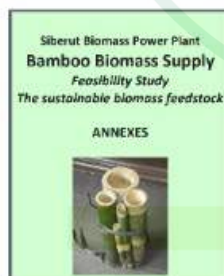




# Studies & Surveys & Cooperation



Evaluation and certification of BBiT bamboo species;  
 Coaching and business development small scall industry;  
 Empowerment and business development between research institutes & and private business for (handicrafts, pulp & paper, non-forestry products);  
 Universities Indonesia on pest & soil analysis;  
 - Use of bamboo charcoal for soil improvements  
 - Student graduation & training programs  
 Universities & research institutes overseas for Tissue Culture development





# Cooperations



## To Whom It May Concern

Hereby PT Bambu Nusa Verde (BNV) confirms that together with the below parties,

A study is ongoing for : To evaluate and definite the BAMBOO CARBON STORAGE.

Area of research Indonesia : Kallurang, Sleman, Yogyakarta  
Belgium : Merksplas, Antwerp

Duration : Started on December 20, 2020

Parties & institutions involved:

- Gadjah Mada University : Faculty of Agricultures, Department of Soil science, Yogyakarta
- PT Bambu Nusa Verde : Co-researchers bamboo species, practical execution  
Jl Mangunan, Tebonan, Pakem, Sleman, Yogyakarta, Indonesia
- Liège University : Faculty of Agro-Bio Tech Gembloux, Belgium
- De Kleine Boerderij : Beisjan's bamboo plantation, Merksplas

## To Whom It May Concern

Hereby De Kleine Boerderij (DKB) confirms that the Vlaamse Overheid Agentschap Innoveren en Ondernemen (VLAIO = the Flemish Government Agency for Innovation and Entrepreneurship) awarded the following Project for Implementation:

Project no. : HBC.2018.2270  
Subject : Anchoring the control over the world production of bamboo plantations in Flanders through technological research  
Implementation : June 2, 2019 till April 30, 2021

Nomor : 2294/BNV-KRY/Cocoa-Coffee/VI/2020 19 Juni 2020

PERJANJIAN KERJASAMA  
PT. BAMBU NUSA VERDE  
DENGAN SUWARDI MULYONO  
DALAM BIDANG PENELITIAN DAN PENGEMBANGAN BUDIDAYA KAKAO dan KOPI

yang Bertanda tangan dibawah ini :

Nama : Yohana Fransisca S

AGREEMENT

between  
GreenBone Ortho Spa, Faenza, Italy  
and  
PT Bambu Nusa Verde, Yogyakarta, Indonesia  
for  
Research, Development, Planting and Harvesting of Rattan Manau

No: 2490/GBD-BNV/VII/2021

PERJANJIAN KERJASAMA

ANTARA

PT. BAMBU NUSA VERDE

DENGAN

KELOMPOK TANI HUTAN "NGUDI MAKMUR"

TENTANG

PEMBERDAYAAN DAN PENGEMBANGAN USAHA

NOMOR: 2911 / BNV - MITRA / VIII / 2021  
NOMOR: KTH VM - BNV / 001 / VIII / 2021

KELOMPOK TANI HUTAN "SUMBER REJEKI"

TENTANG

PEMBINAAN DAN PENGEMBANGAN USAHA

NOMOR: 2252 / BNV - MITRA / X / 2019  
NOMOR: 001 / KTHSR - BNV / X / 2019

KELOMPOK TANI HUTAN "SAHABAT BAMBU"

TENTANG

PEMBERDAYAAN DAN PENGEMBANGAN USAHA

NOMOR: 2251 / BNV - MITRA / X / 2019

KELOMPOK TANI HUTAN "TAMAN WISATA BRAJAN"

TENTANG

PEMBERDAYAAN DAN PENGEMBANGAN USAHA

NOMOR: 2253 / BNV - MITRA / X / 2019  
NOMOR: 001 / KTHB - BNV / X / 2019

PERJANJIAN KERJASAMA  
PT. BAMBU NUSA VERDE  
DENGAN KELOMPOK TANI TERKAIT\*  
DALAM BIDANG PENELITIAN DAN PENGEMBANGAN BUDIDAYA KAKAO

No. 1004/BNV-H/II/17

PERJANJIAN KERJASAMA  
PT. BAMBU NUSA VERDE  
DENGAN KELOMPOK TANI TERKAIT\*  
DALAM BIDANG PENELITIAN DAN PENGEMBANGAN BUDIDAYA BAMBU

No. 1007/BNV-H/II/17

UNIVERSITAS GADJAH MADA  
FAKULTAS PERTANIAN  
DEPARTEMEN TANAH

Nomor : 047 TU/DT/2020  
Hal : Kerjasama

2 Juli 2020

Kepada Yth.  
Direktur Bambu Nusa Verde  
Di Yogyakarta

Sehubungan dengan pelaksanaan kegiatan Riset kolaborasi Bamboo for Biochar an Opportunity for scientific, societal and environment Change in Indonesia antara UGM, Universitas Andalas, Universitas Syiah Kuala, Universitas Udayana Indonesia dengan Universitas Ghent Belgium 2019-2021 maka kami bermaksud menjalin kerja sama dengan PT. Bambu Nusa Verde.

NOTA KESEPAHAMAN

Antara

BALAI BESAR PULP DAN KERTAS

Dengan

PT. BAMBU NUSA VERDE

Tentang

PENGEMBANGAN ILMU PENGETAHUAN DAN TEKNOLOGI, SERTA PENINGKATAN KUALITAS SUMBER DAYA MANUSIA

Nomor : 34/BBPK/KS/VII/2019

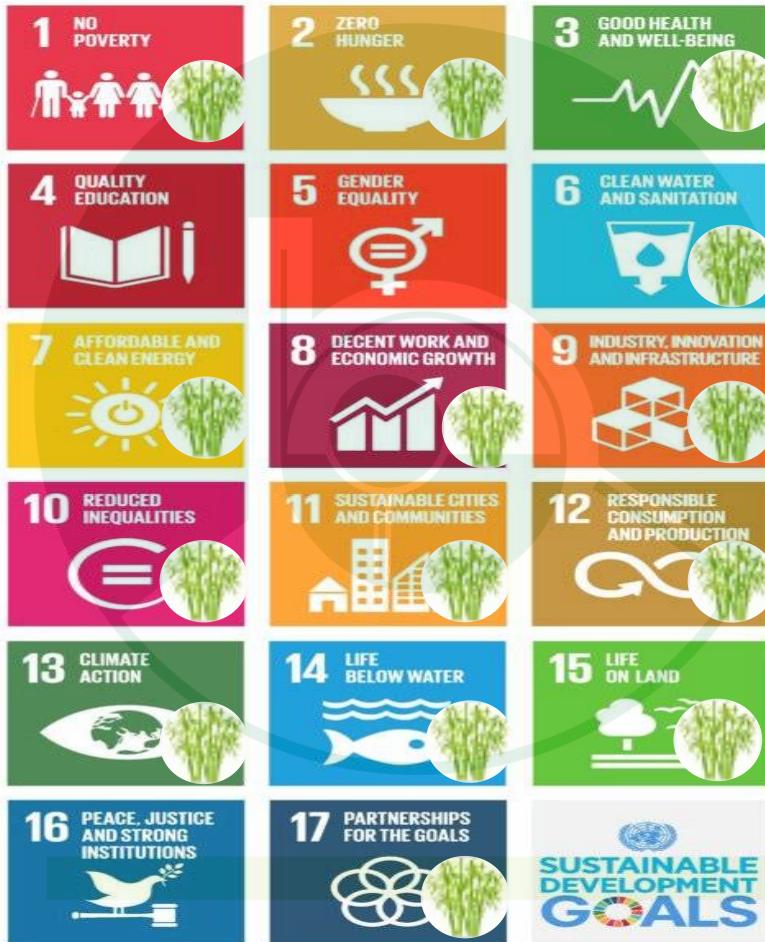
MEMORANDUM OF UNDERSTANDING  
BETWEEN  
CENTER OF BATIK AND HANDICRAFT OF MINISTRY OF INDUSTRY OF  
THE REPUBLIC OF INDONESIA  
AND  
PT BAMBU NUSA VERDE  
CONCERNING  
BAMBOO PRODUCT DEVELOPMENT FOR CRAFT

Number : 30 / MoU / BPPI - BBKB / XI / 2019





# Sustainable Development Goals



Environment	SDGs_9 Sectors
-------------	----------------

- |                         |  |
|-------------------------|--|
| 1. Water Preservation   | 3. Good health and well being              |
| 2. Carbon Sequestration | 6. Clean water and sanitation              |
| 3. Oxygen Production    | 7. Affordable and clean energy             |
| 4. Land Restoration     | 11. Sustainable cities and communities     |
|                         | 12. Responsible consumption and production |
|                         | 13. Climate action                         |
|                         | 14. Life below water                       |
|                         | 15. Life on land                           |

Industry and Small and Medium Enterprises and Renewable Energy	SDGs_14 Sectors
--	-----------------

- |  |   |
|--|---|
| 1. Industry of building materials, construction, reinforcements, and skyscrapers | 1. No poverty                               |
| 2. Industry of pulp, paper, and textile  | 2. Zero hunger                              |
| 3. Industry of food  | 3. Good health and well being               |
| 4. Handicrafts and utensils  | 6. Clean water and sanitation energy        |
| 5. Activated carbon, nano carbon, pharmaceutical                                 | 7. Affordable and clean energy              |
| 6. Bamboo chips  | 8. Decent work and economic growth          |
| 7. Bamboo pellets  | 9. Industry, innovation, and infrastructure |
| 8. Bamboo charcoal (Bio-coal)  | 10. Reduced inequalities                    |
| 9. Syngas  | 11. Sustainable cities and communities      |
| 10. BioDME/Biomethanol   | 12. Responsible consumption and production  |
|  | 13. Climate action                          |
|  | 14. Life below the sea                      |
|  | 15. Life on land                            |
|  | 17. Partnerships for the goals              |

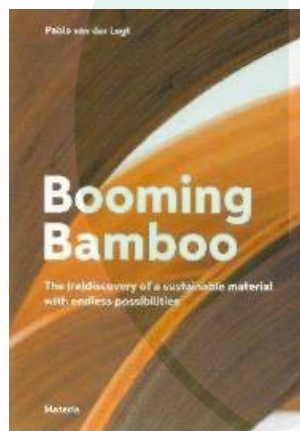
**Bamboo = 14 out of 17 SDG**



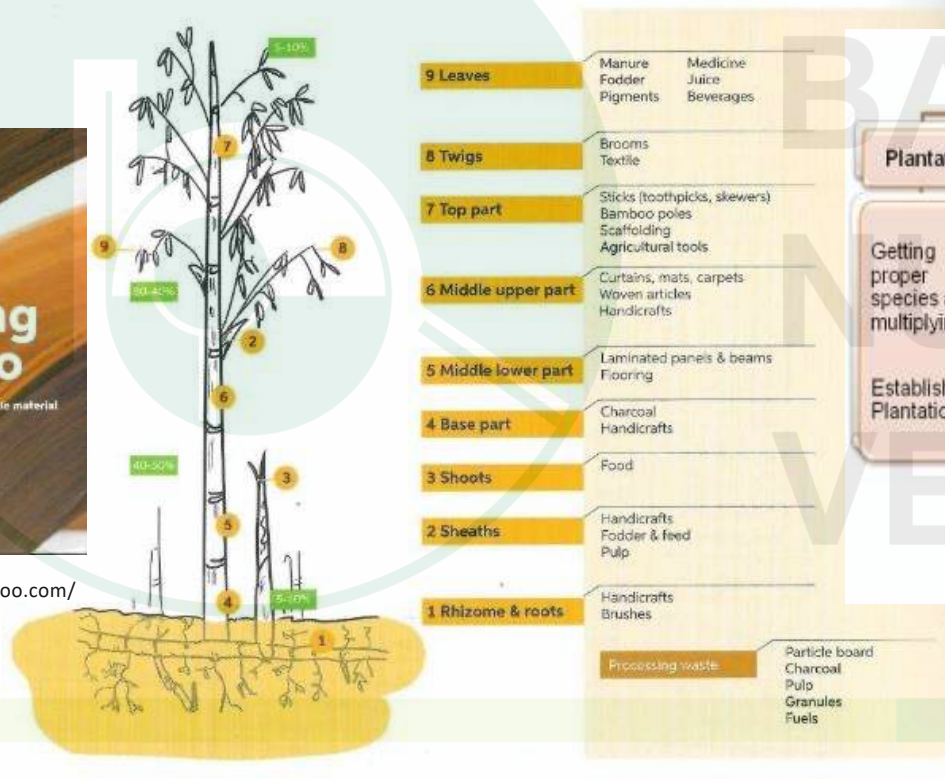
# Sustainable Economy

An estimated 10,000 documented uses of bamboo  
 Bamboo as alternative of raw material to decrease and prevent deforestation

Figure 3.4 - The Chinese model - utilization of the full bamboo stem <sup>14</sup>



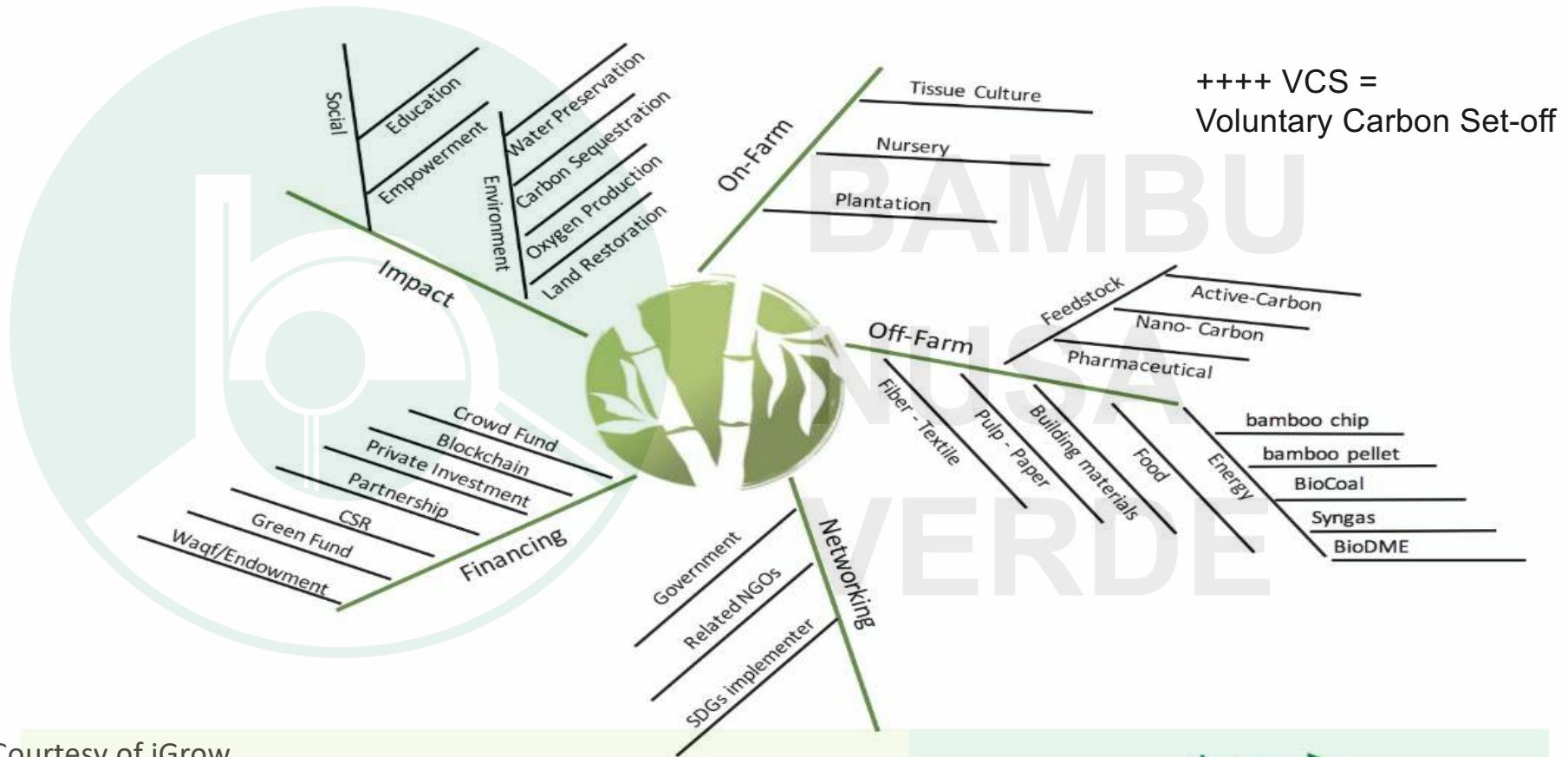
<https://boomingbamboo.com/>



<https://www.inbar.int/wp-content/uploads/2020/05/1499156135.pdf>



# “Green Gold” the BIG Picture



Courtesy of iGrow



# Carbon OFF-SET COP25 – Paris – article 6

What does the Paris Agreement say about carbon markets?

Article 6 has three operative paragraphs, two of which relate to carbon markets:

- **Article 6.2** provides an accounting framework for international cooperation, such as linking the emissions-trading schemes of two or more countries.

It also allows for the international transfer of carbon credits between countries.

- **Article 6.4** establishes a central UN mechanism to trade credits from emissions reductions generated through specific projects. For example, country A could pay for country B to build a wind farm instead of a coal plant. Emissions are reduced, country B benefits from the clean energy and country A gets credit for the reductions.

COP 26

GLASGOW  
?

***Planting bamboo will be easier and .....***

<https://www.wri.org/insights/what-you-need-know-about-article-6-paris-agreement> - Dec 2019





# Bamboo >< Carbon Storage

Bamboo can absorb up to 12 tons of CO<sub>2</sub> per hectare while producing 30 percent more Oxygen (O<sub>2</sub>) than trees → This makes the plant known as an efficient air purifier (Artiningsih (2012)).

Like all plants, **bamboo stores carbon.**

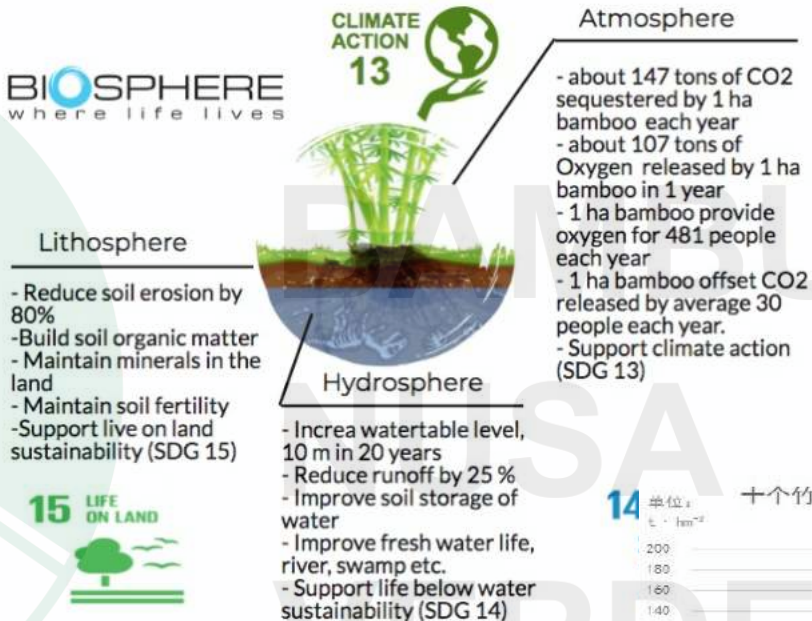
**STORES UP TO 600 TONNES OF CARBON PER HECTARE**

Over a period of 30 years, one hectare of bamboo plants and its products can store up to 600 tonnes of carbon per hectare.

**Durable bamboo products include:** pipes, shells for transport vehicles, blades of wind turbines, shipping containers, flooring and housing. Bamboo can provide a low-carbon alternative to materials including timber, cement, steel and plastic.

Bamboo agroforests sequester up to 50 tonnes of CO<sub>2</sub> per hectare per year

BIOSPHERE  
where life lives



- The carbon storage of moso bamboo forest ecosystem is 106.362 t h/m<sup>2</sup>: vegetation layer 32.18%, soil layer 67.20%, litter layer 0.62%
- For a single moso bamboo tree, culm: 50.97%, leaf only: 4.87% of total carbon storage
- Underground carbon accounts for 37.62%

**Potential results of biomass and carbon above and below ground *Dendrocalamus asper* in the community forest are Biomass: 423,670 (±129,680) Ton/ha, Carbon: 208,540 (±63,850) Ton/ha and CO<sub>2</sub> absorption: 768,530 (±234,340) Ton/ha.**



The carbon storages of ten main bamboo species

# Research Topics & Parties

## The “Inter-working”

**De Kleine Boerderij**  
Merkspas, Belgium

Bamboo forest

**Agro-Bio Tech Gembloux**  
**Liège University, Belgium**  
**Echanges Eau-Sol-Plante**

(I) Soil Organic Carbon (SOC) &  
Silicae /Advanced weathering &  
Life Cycle Assessments (LCA)

**Gajah Mada University,**  
Yogyakarta, Indonesia

(I) Soil department - SOC &  
(II) Forestry department – Carbon Storage  
above Ground (CSG) - bamboo  
measurement (size, roots, litter)

**Liège University, Belgium**  
**Wood Department**

(II)+(III) LCA of Bamboo  
Different end-products and  
Carbon storage

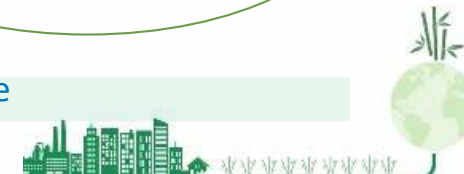
**Bamboo Nusa Verde**  
Yogyakarta, Indonesia

(II) Bamboo model plants  
Measurements and  
Evaluations Culm

**Community Sleman**  
Yogyakarta, Indonesia

Bamboo forest

Life Cycle Assessment / LCA = Step (I) + (II) + (III) = to be total carbon negative







# *Dendrocalamus asper* – Growth of a BBiT



April 2010



Planted **1 May 2010**



1 Juli



8 Sept



30 Nov



2 Jan 2011



29 Aug



21 Nov – 26 new shoot



Jan 1, 2012



Jan 2012





# BBiT Growth



Juni 2012 – new shoots no 33; 19 m-42



Jan 1, 2013



Jan 1, 2014



Sep 25, 2014 – Harvesting shoots



1 Mei 2015 – 5 yr



5 Feb 2016

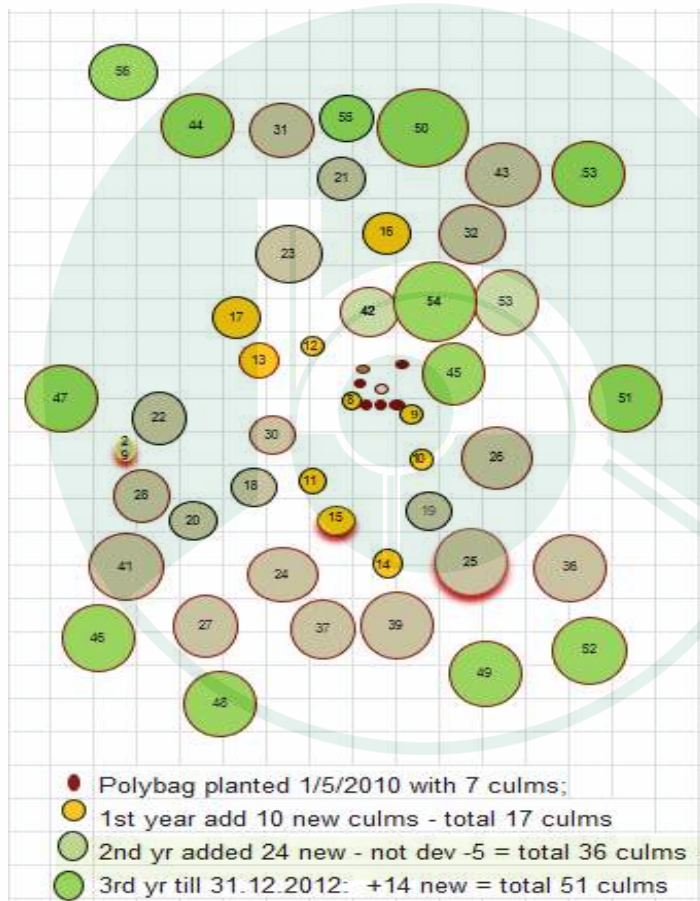


17 Feb 2017





# BBiT Growth



# Carbon storage above Ground



Measurements of different bamboo species and age:  
Growth, clump size, weight, moisture content, litter, ...

*Dendrocalamus asper*

*Bambusa balcooa*

*Bambusa balcooa* var. *Capensis*

*Bambusa blumeana*

*Bambusa vulgaris* 'Vulgaris'







# Soil Organic Carbon – (tempered)



EGM-5 portable CO2 gas analyser

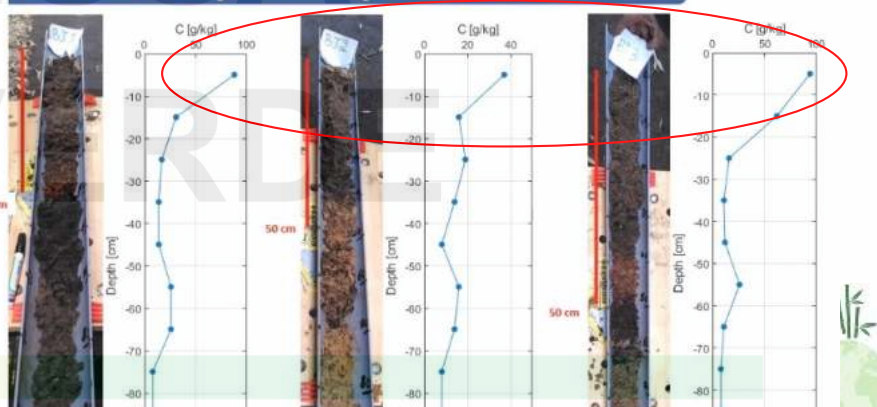


Results:  
June 15, 2022

Results - Meadow



Results – *Phyllostachys aureosulcata*



Research Belgium: Univ. AgroBio-Tech, Gembloux, Belgium

Location: De Kleine Boerderij, Merksplas

Species: *Phyllostachys* sp.

Data collection: April 6, 2022

Tentative conclusion: up to 8x more C gr/kg in bamboo soil





# Soil Organic Carbon (tropical)



Research by: Forestry Department of Universitas Gadjah Mada, Yogyakarta, Indonesia

Location: Slopes of Merapi Volcano, & BNV, Sleman, Yogyakarta, Indonesia

Species: *Dendrocalamus asper* = bambu petung, *bambusa balcooa*

Data collection: April 20, 2022





# Dendrocalamus asper Growth measurement



183kg



For	Philipp	BBiT	Unit	Kaliurang
Total poles		100	pc	
Culm weight		14	kg	
Total clump		1,400	kg	
Harvest %		35%	pcs	
per culm	64.6		kg	80
per clump	5			5
total/clump	323	490	kg	400
per ha	204	204	Clumps	204
Tot/ha	65,892	99,960	kg	81,600
Ton/ha	65.9	100.0	ton	81.6

**BBiT – Febr. 2020 (RIP) :**

- Standing: 120+culms
- Shoots: 25+

Vegetables	per clump	unit	Per ha
Shoots Febr 2020	17	pc	
Net weight	30	kg	6,120
Price per kg	7,500	Rp/kg	
Per clump	225,000	Rp	45,900,000
USD	15	USD	3,060



REBUNG KEMASAN 250GRM  
Rp 10.000



# Bamboo Paper is STRONG



Mandalay  
Myanmar  
2017





# Seeds – Volcano - Alarm





# Bamboo for Survival



Damianus Wera, Sept 2011 (4/3/2022)



Paule Island, Mount Rokatenda



Dendrocalamus asper = Bambo Petung/Betung



Only 3-4 months rain



*“Air Hujan, Batang Pisang, Batang Bambu, Akar Pohon Ara dan Wae Poa (uap panas gunung api)”*

*Air Bambu adalah air yang diambil dari batang/akar bambu. Cara mengambilnya: akar dekat batang bambu dipotong sebagian kecil dan pada bagian yang dipotong/dilukai dipasang bila bambu kecil sebagai tempat mengalirnya tetes-tetes air yang kemudian ditampung dalam wadah bambu. Air yang dihasilkan tidak sebanyak air pisang, hanya mencapai 1 ruas bambu untuk waktu 24 jam. Jenis bambu yang bisa menghasilkan air adalah bamboo betung dan bambu aur.*







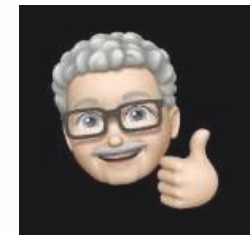
# Our Team



For follow-up:

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Tebonan, Harjobinangun, Pakem,  
Sleman, Yogyakarta 55582  
[info@bambunusaverde.com](mailto:info@bambunusaverde.com) /  
[www.bambunusaverde.com](http://www.bambunusaverde.com)  
Telp.: 0274 898 022, 055  
WA/Nisa : +62 815-4281-8729  
+62 812-8306-0722

Thanks to the  
TEAM  
to make **THIS**  
Possible





*Bambu from Indonesia for the WORLD*



*Powering the Future*



**THANK YOU**





# Social Media References - Certificate



**BNV Production:** [https://www.youtube.com/watch?v=Ovv\\_p89jtw8](https://www.youtube.com/watch?v=Ovv_p89jtw8)

**Abroad:**

Benin West Africa: 11.2016

[https://www.youtube.com/watch?v=D\\_BXknK4\\_Is&t=24s](https://www.youtube.com/watch?v=D_BXknK4_Is&t=24s)

5.2018: [https://www.youtube.com/watch?v=uXax5ZA\\_AMI&feature=em-share\\_video\\_user](https://www.youtube.com/watch?v=uXax5ZA_AMI&feature=em-share_video_user)

Malawi, Central Africa: <https://www.youtube.com/watch?v=sUJzcZ2mpkU>

<https://www.linkedin.com/feed/update/urn:li:ugcPost:6488456693612187648/>

**Indonesia:**

Ketapang, West Kalimantan: <https://www.youtube.com/watch?v=PVqEzF6Aezc>

Siberut, Mentawai: <https://www.youtube.com/watch?v=tIPcxVc21go&t=164s>

Energi : <https://www.youtube.com/watch?v=OXVIFPIOItM>

**Social Media BNV:**

Youtube: <https://www.youtube.com/channel/UCV2CdBb3JyWOOySefa6m6mA>

Instagram: [instagram.com/bambunusaverde/?hl=id](https://www.instagram.com/bambunusaverde/?hl=id)

Facebook: [www.facebook.com/bambunusaverde](https://www.facebook.com/bambunusaverde)

Twitter: @bambunusa\_verde

**Registered Producer and Distribution and Certification:**

<https://drive.google.com/file/d/1WHaSlkBtpwks8J2CZtdnni0etC30Y5y/view?usp=sharing>

**Company Profile :**

<https://www.youtube.com/channel/UCV2CdBb3JyWOOySefa6m6mA/videos?view>  
[www.bambunusaverde.com](http://www.bambunusaverde.com)





# List of Some Customers & Projects



NO	CUSTOMER	AREA	End-use
<b>INDONESIA</b>			
1	Kementerian PUPR	Seluruh Indonesia	Greenbelt Reservoir
2	Dinas Kehutanan D.I Yogyakarta	D.I Yogyakarta	Plantation & Arboretum
3	Dinas Kehutanan	Palu	Plantation
4	Dinas Kehutanan	Kalimantan Selatan	Plantation & Arboretum
5	Taman Hutan Rakyat Sultan Adam	Kalimantan Selatan	Arboretum
6	Pusat Pembangunan Ekoregion Kalimantan (P3EK)	Kalimantan Timur	Riverbank conservation
7	Cabang Dinas Kehutanan Banyumas	Banyumas	Arboretum
8	PDAM Malang	Malang	Rehabilitation
9	Kebun Raya Indrokilo	Boyolali	Bamboo collection
10	Yayasan Dian Desa	Kalimantan Barat	Distribute community
11	Jasa Marga - PT Widyamita	Tol Semarang	Toll road fencing
12	PT Sampoerna Agro	Jasinga, Jawa Barat	Biomassa/pulp
13	PT Indobel Bamboo Merapi	Magelang	Construction
14	PT Hutan Ketapang Ind.	Ketapang, Kalimantan Barat	Biomassa
15	PT Kaltim Prima Coal	Kalimantan Timur	Rehabilitate mine
16	PT Gudang Garam	Kalimantan	CSR
17	PT Riau Andalan Pulp & Paper	Riau, Sumatera	Pulp
18	Clean Power Indonesia	Siberut, Sumatera	Biomassa
19	PT. Semen Indonesia	Jawa Timur	Construction
20	PT. Silva Rimba Lestari	Kalimantan Barat	Decking
21	PT. Semen Grobogan	Jawa Tengah	Sound Barrier
22	PT Bukit Asam	Lampung dan Tanjung Enim	
23	PT Timah Tbk	Bangka Belitung	
24	PT Arutmin Indonesia	Kalimantan Selatan	Rehabilitation mine
25	PT Borneo Indobara	Kalimantan Selatan	
26	Medco Energy, Tbk	Malang dan Papua	Plantation
27	CV Flora Nursery	Aceh	Plantation
28	PT PROLINDO UTAMA KARYA	Jawa Barat	Plantatio biomassa

NO	CUSTOMER	AREA	End-use
29	PT Condong Garut	Jawa Barat	Plantation biomassa
30	MGP Group	Jambi, Bangka, Rangkasbitung	Plantation energy
31	PT Arutmin Indonesia	Kalimantan Selatan	Plantation
32	PT Amman Mineral Nusa Tenggara	Nusa Tenggara Barat	Rehabilitate mine
33	PT Sulotco Jaya Abadi	Tana Toraja	Plantation
34	PT Galasari Gunung Sejahtera	Jawa Timur	Fence Sound
35	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	Kapuas Hulu, Kalimantan Barat	Support Rubber collecitons
36	PT Berkah Bumi Ciharang	Subang, Jawa Barat	Plantation & Arboretum
37	Jiwa Jawa Resort	Banyuwangi, Jawa Timur	Arboretum & landscape

NO	CUSTOMER	Country	End-use
<b>EXPORT</b>			
1	Hortus Capensis	South Africa	Biomass
2	STE Bambou Masse	Benin	Biomass
3	Matadi Bamboo Plantation	Kongo	Biomass
4	Corem Green	Cambodia	Biomass
5	Botanica Horticulture	Australia	Plantation
6	Thai Orchids Village Community Enterprises	Thailand	Plantation
7	Afribam	Malawi	Biomass
8	Passage to Vietnam	Vietnam	Arboretum
9	Sarawak Timber Industry Development Corporation (STIDC)	Sarawak	Plantation
10	Sarawak Forestry Corporation	Sarawak	Plantation
11	Verde Bambu	Italy	Ornamental
12	Vista Verde BV	Belgium	Ornamental
13	Viveros Atlantico S.	Spanyol	Ornamental
14	Iribov West Africa Ltd.	Ghana	Plantation
15	Tombwe Processing Limited	Zambia	Plantation