



# *Bamboo Propagation and Plantations*

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

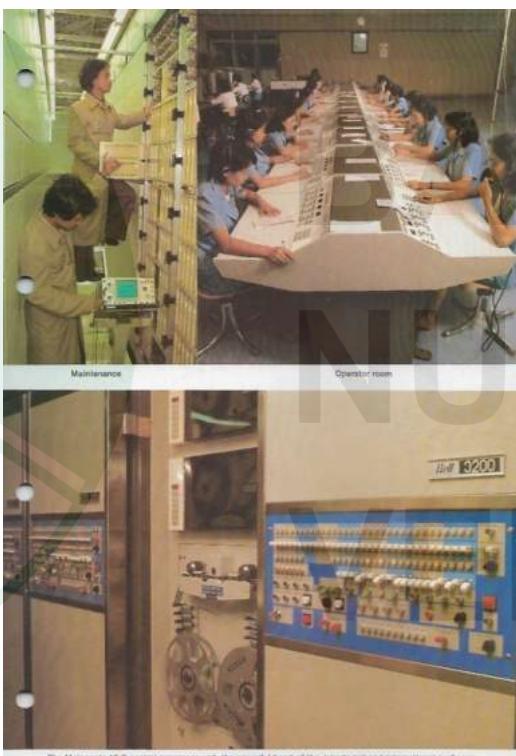
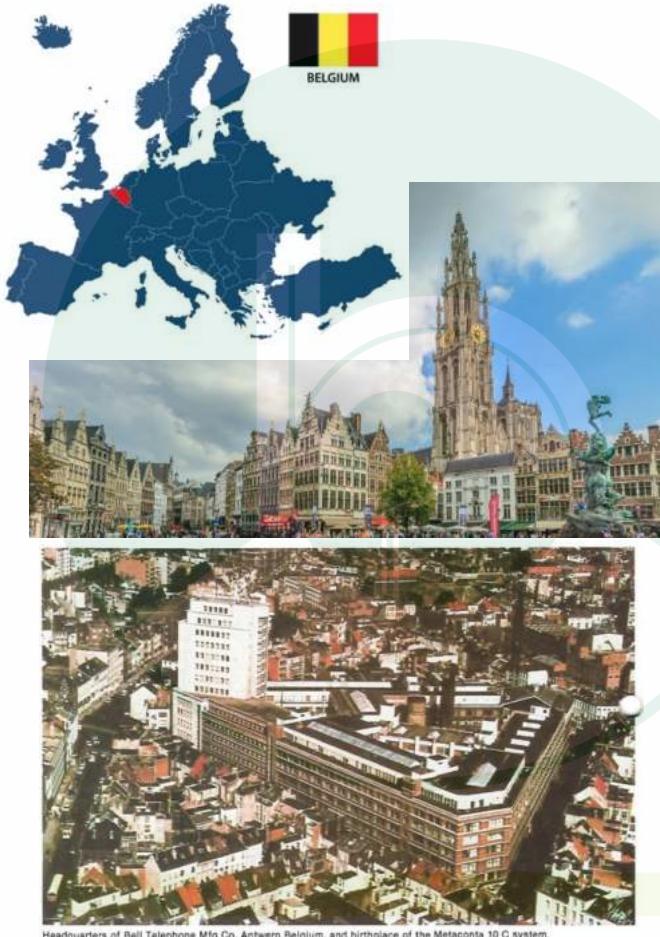
**September 18, 2022**

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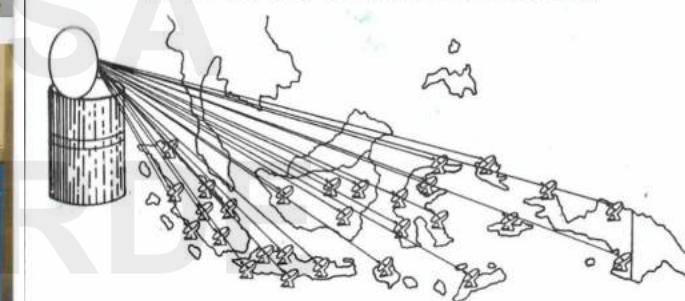
# From Belgium to Indonesia to BAMBOO



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



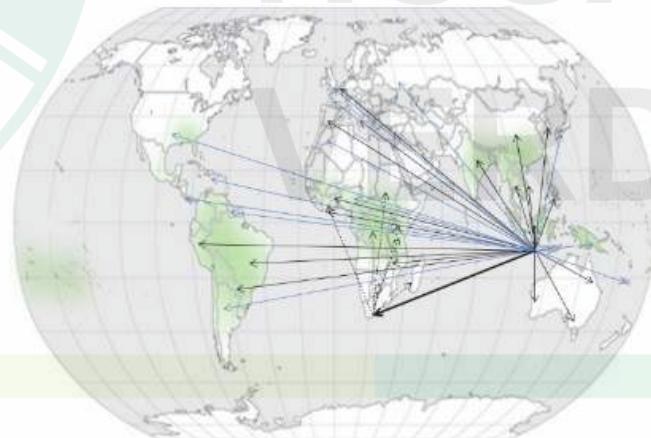
Johan Gielis



Marc Peeters

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.



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

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

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

Super-formula

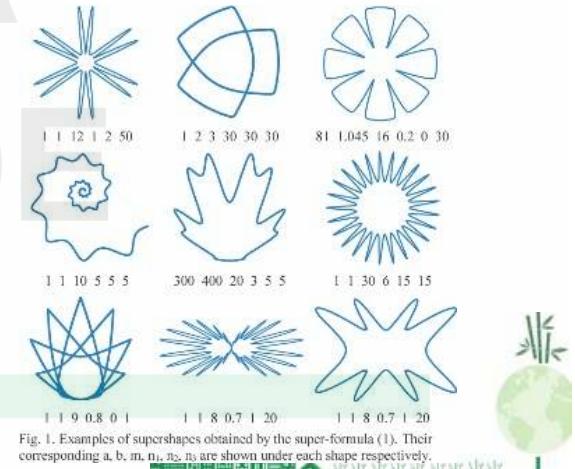


Fig. 1. Examples of supershapes obtained by the super-formula (1). Their corresponding  $a$ ,  $m$ ,  $n_1$ ,  $n_2$ ,  $n_3$  are shown under each shape respectively.



# 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.

Both are IP registered since 2021.



Applicant's Name  
Address  
Registration Acceptance Date  
Plant Type  
Variety Name

: REGENT OF SLEMAN  
: Jl. Parasamya, Beran Lor, Tridadi, S  
: August 12, 2021  
: Bamboo  
: Sembada Verde



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

# OUR LOCATION



Jl Boyong 13, Tebonan,  
Harjo Binangun, Pakem,  
Sleman, Yogyakarta



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



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# Mother Plants & Initiation

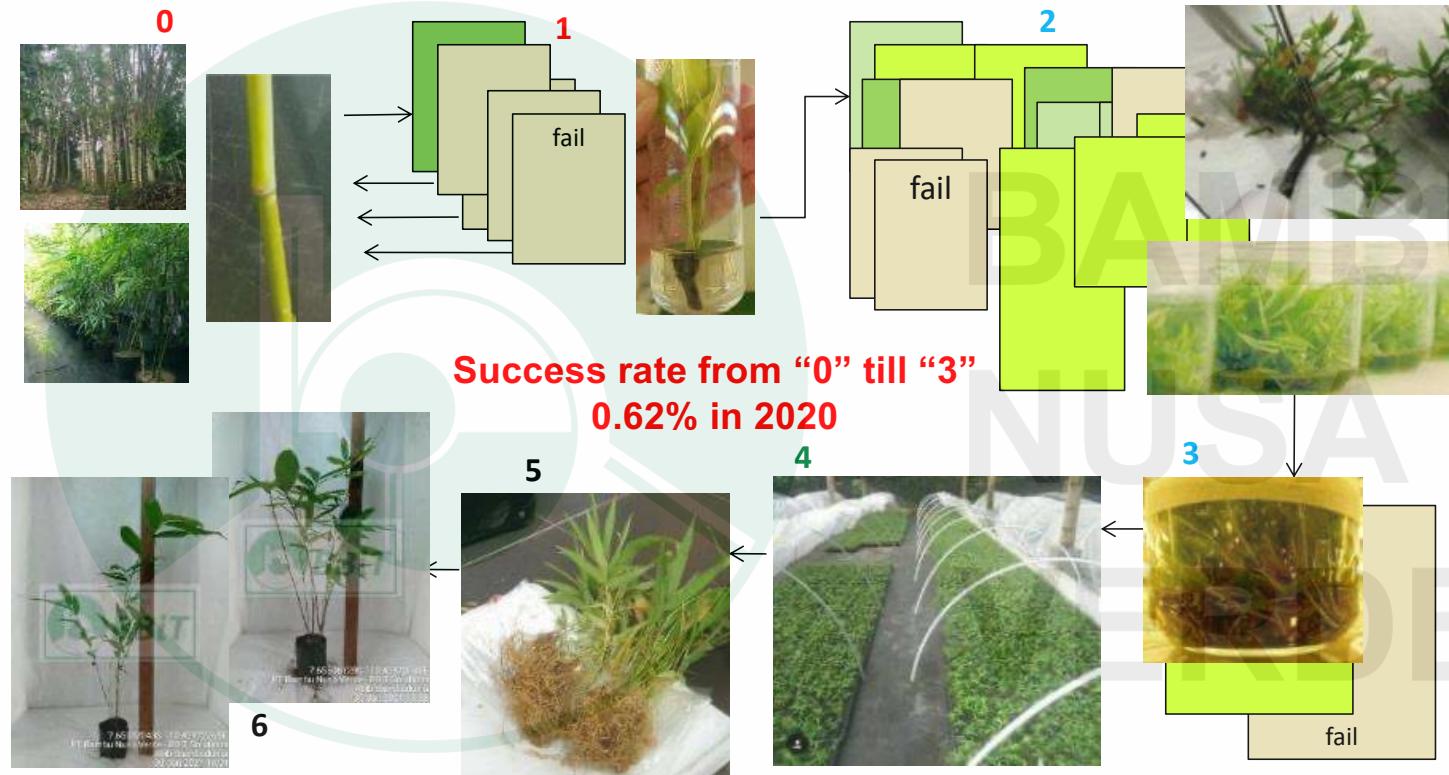


OVERVIEW	Qty	%	Total species	Production – 2021
Industrial bamboo	85	46%	24	34% 9 36%
Ornamental Bamboo	48	26%	30	42% 9 36%
Industri & Ornamental	50	27%	18	24% 7 28%
<b>Total</b>	<b>183</b>	<b>100%</b>	<b>72</b>	<b>100% 25 100%</b>

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



## Risk stages

Extremely difficult: 0 & 1

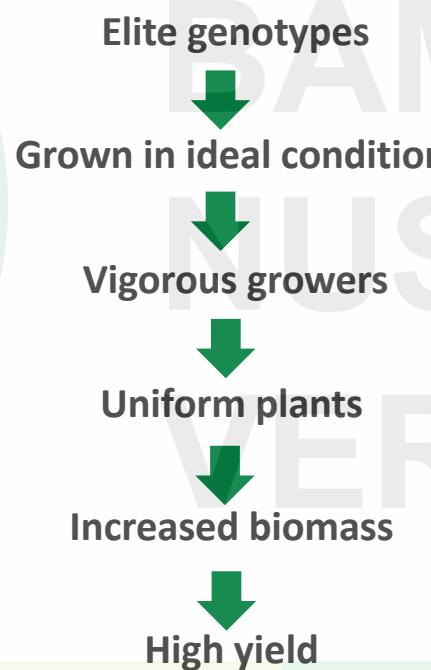
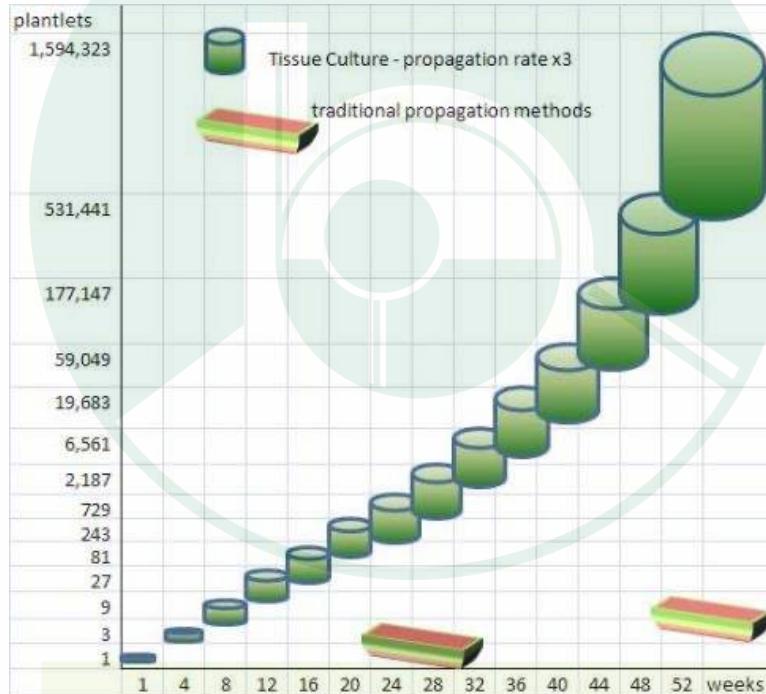
Medium Risk: 4

Very difficult: 2 till 3

Low risk: 5 and 6

# 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





# Stock & Production



September 9, 2022

No	Species	Code	TOTAL
1	<i>Bambusa</i> <i>auriculata</i>	Auri	414
2	<i>Bambusa</i> <i>balcooa</i>	35	31,573
	<i>Bambusa</i> <i>balcooa</i>	35(0A)	3,851
	<i>Bambusa</i> <i>balcooa</i>	35(1)	18,769
	<i>Bambusa</i> <i>balcooa</i>	35(1)A	2,909
	<i>Bambusa</i> <i>balcooa</i> -TOTAL	35 xx	57,102
3	<i>Bambusa</i> <i>balcooa</i> var. <i>Capensis</i>	36	6,170
	<i>Bambusa</i> <i>balcooa</i> var. <i>Capensis</i>	36(3)	12,175
	<i>Bambusa</i> <i>balcooa</i> var. <i>Capensis</i>	36(4)	2,604
	<i>Bambusa</i> <i>balcooa</i> var. <i>Capensis</i>	37(1)	10,278
	<i>Bambusa</i> <i>balcooa</i> var. <i>Capensis</i>	37(1)A	291
	<i>Bambusa</i> <i>balcooa</i> var. <i>Capensis</i> -TOTAL	36/37 xx	31,518
4	<i>Bambusa</i> <i>blumeana</i>	02	4,442
	<i>Bambusa</i> <i>blumeana</i>	03	4,581
	<i>Bambusa</i> <i>blumeana</i>	03A	3,147
5	<i>Bambusa</i> <i>chungii</i> 'Barbellata'	CHB	1,030
6	<i>Bambusa</i> <i>eutuldoides</i> 'Viridi-vittata'	OV	506
7	<i>Bambusa</i> <i>heterostachya</i> ( <i>glaucophylla</i> )	GP2	333
8	<i>Bambusa</i> <i>heterostachya</i>	HS	18
9	<i>Bambusa</i> <i>lako</i>	LK1	99
10	<i>Bambusa</i> <i>maculata</i>	BMT	10
11	<i>Bambusa</i> <i>multiplex</i> 'Shimada'	30(0)	6,554
12	<i>Bambusa</i> <i>multiplex</i> 'Green Hedge'	31(0)	1,888
	<i>Bambusa</i> <i>multiplex</i> 'Green Hedge'	31(1)	50
13	<i>Bambusa</i> <i>multiplex</i> 'Alphonse Karr'	32	1,418
	<i>Bambusa</i> <i>multiplex</i> 'Alphonse Karr'	32(0)	700
14	<i>Bambusa</i> <i>multiplex</i> 'Fernleaf' (small)	33	780
15	<i>Bambusa</i> <i>multiplex</i> - 'Goldstripe'	34	40
16	<i>Bambusa</i> <i>oldhamii</i>	BA	2,680
17	<i>Bambusa</i> <i>textilis</i> 'Gracilis'	TG	1,046
18	<i>Bambusa</i> <i>tuldoides</i> ( <i>ventricosa</i> )	VT(1)	50
	<i>Bambusa</i> <i>tuldoides</i> ( <i>ventricosa</i> )	VT2	2,038
19	<i>Bambusa</i> <i>vulgaris</i> 'Vittata'	K7	270
	<i>Bambusa</i> <i>vulgaris</i> 'Vittata'	K2	1,122
	<i>Bambusa</i> <i>vulgaris</i> 'Vittata'	KL(1)	1,114

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

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

Genus	Species	Clone
<i>Bambusa</i>	23	41
<i>Dendrocalamus</i>	10	24
<i>Gigantochloa</i>	3	3
<i>Guadua</i>	2	2
<i>Schizostachyum</i>	2	2
<i>Thrysostachys</i>	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

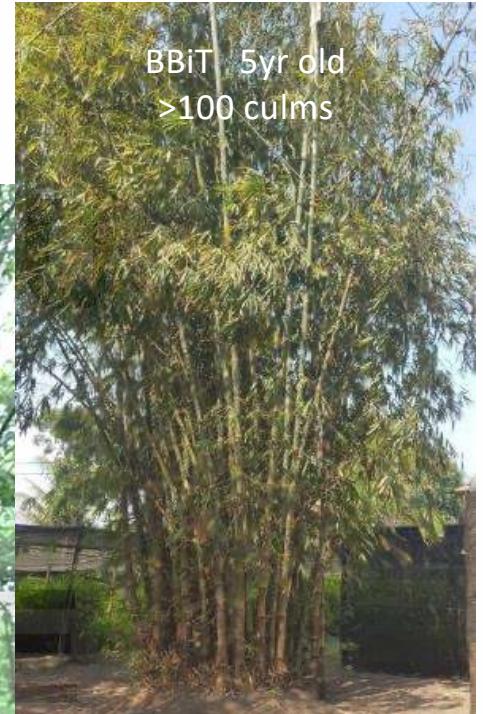
cutting



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

Cutting 5 yr old  
< 20 culms



# Re-greening Gunung Batur, Bali



# 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  $2.5 \times 8$  meter = 500 clumps/ha

Species: *Dendrocalamus asper* ex TC/ BNV

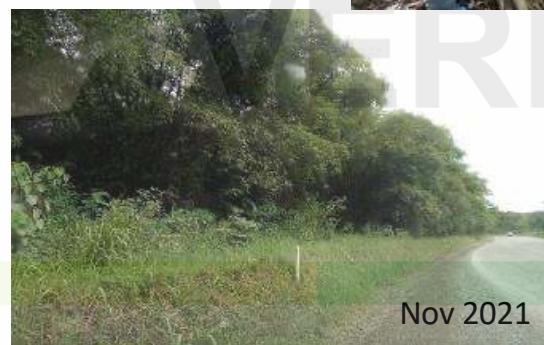
Mixed with cassava and fertilizer applied – cassava harvested in March 2012 – well maintained

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





PT KALTIM PRIMA COAL



# Ex-mining Rehabilitation

Sangatta, Kalimantan Timur – PT Kaltim Prima Coal

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

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# Rehabilitating Ex-mining

## PT Bukit Asam, Tanjung Enim

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



Status January 2022; Planted February 2021



Nov 2021

# Bamboo Plantation

## Ketapang, West Kalimantan



Land before planting



Soil type dystrudept and quartzipsammens



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. balcooa*, *B. balcooa* var. *Capensis* – 2015 total 500+ha

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# 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://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>

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# Africa



Export to  
15 Countries



Nursery South Africa

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# 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 ( $t\text{ha}^{-1}\text{yr}^{-1}$ )
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



<https://www.springerprofessional.de/en/bamboo-based-technology-for-resource-conservation-and-management/17406448>

<https://www.inbar.int/wp-content/uploads/2020/05/1503284320.pdf>

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# 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



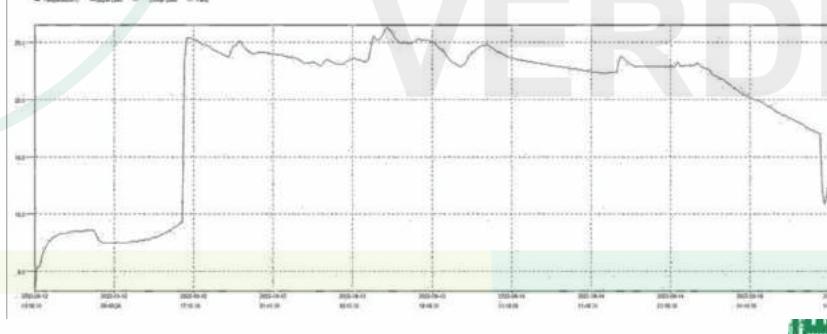
Remain in tunnel with temp and humidity  
controlled for 10 days



# Delivery in last month



Survival : 99+%



Export: 43.000 plugs  
Local: 10.000 polybag



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# 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



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

Fertilizing is **HIGHLY** recommended

# Utilization based on Culm Age

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

Age	Usage	Picture
7-30 days	Edible shoot and fodder	
1-12 months (juvenile)	Production of ropes and basketry (8 – 12 months old)	
1-2 years (adult)	Basketry, mats	

Age	Usage	Picture
2-3 years (late adult)	Furniture products and non-structural applications; paper and pulping	
3-4 years (old age)	Structural applications, industrial products	
>4 years (advanced old age)	Too brittle (lack of elasticity)	



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



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

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# Collaboration





# Collaboration



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

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# 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, no-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





PERJANJIAN KERJASAMA

ANTARA

PT. BAMBU NUSA VERDE

DENGAN

KELOMPOK TANI HUTAN "NGUDI MAKNUR"

TENTANG

PEMBERDAYAAN DAN PENGEMBANGAN USAHA

NOMOR: 2511/BNV-MITRA/VII/2021

NOMOR: KTHM-BNV/001/VII/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



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/BBPI-BBKB/XI/2019

# 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 define the BAMBOO CARBON STORAGE

Area of research Indonesia : Kalurang, Sleman, Yogyakarta  
Belgium : Merkplas, Antwerp

Duration : Started on December 20, 2020

Parties & institutions involved:

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

## 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

19 Juni 2020

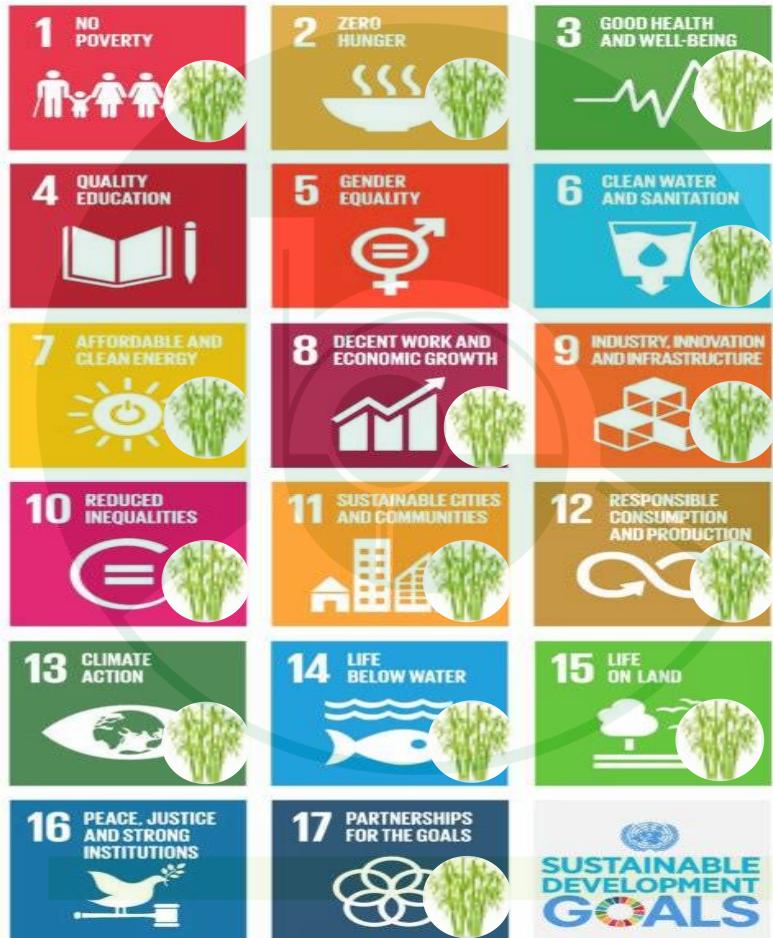
PERJANJIAN KERJASAMA  
PT. BAMBU NUSA VERDE  
DENGAN SUWARDI MULYONO  
DALAM BIDANG PENELITIAN DAN PENGEMBANGAN BUDIDAYA KAKAO dan KOPI

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/GBO-BNV/VII/2021

# Sustainable Development Goals



Environment	SDGs_9 Sectors
<ol style="list-style-type: none"> <li>1. Water Preservation</li> <li>2. Carbon Sequestration</li> <li>3. Oxygen Production</li> <li>4. Land Restoration</li> </ol>	<ol style="list-style-type: none"> <li>3. Good health and well being</li> <li>6. Clean water and sanitation</li> <li>7. Affordable and clean energy</li> <li>11. Sustainable cities and communities</li> <li>12. Responsible consumption and production</li> <li>13. Climate action</li> <li>14. Life below water</li> <li>15. Life on land</li> </ol>

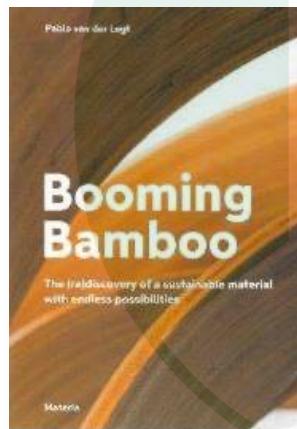
Industry and Small and Medium Enterprises and Renewable Energy	SDGs_14 Sectors
<ol style="list-style-type: none"> <li>1. Industry of building materials, construction, reinforcements, and skyscrapers</li> <li>2. Industry of pulp, paper, and textile</li> <li>3. Industry of food</li> <li>4. Handicrafts and utensils</li> <li>5. Activated carbon, nano carbon, pharmaceutical</li> <li>6. Bamboo chips</li> <li>7. Bamboo pellets</li> <li>8. Bamboo charcoal (Bio-coal)</li> <li>9. Syngas</li> <li>10. BioDME/Biomethanol</li> </ol>	<ol style="list-style-type: none"> <li>1. No poverty</li> <li>2. Zero hunger</li> <li>3. Good health and well being</li> <li>6. Clean water and sanitation energy</li> <li>7. Affordable and clean energy</li> <li>8. Decent work and economic growth</li> <li>9. Industry, innovation, and infrastructure</li> <li>10. Reduced inequalities</li> <li>11. Sustainable cities and communities</li> <li>12. Responsible consumption and production</li> <li>13. Climate action</li> <li>14. Life below the sea</li> <li>15. Life on land</li> <li>17. Partnerships for the goals</li> </ol>

**Bamboo = 14 out of 17 SDG**

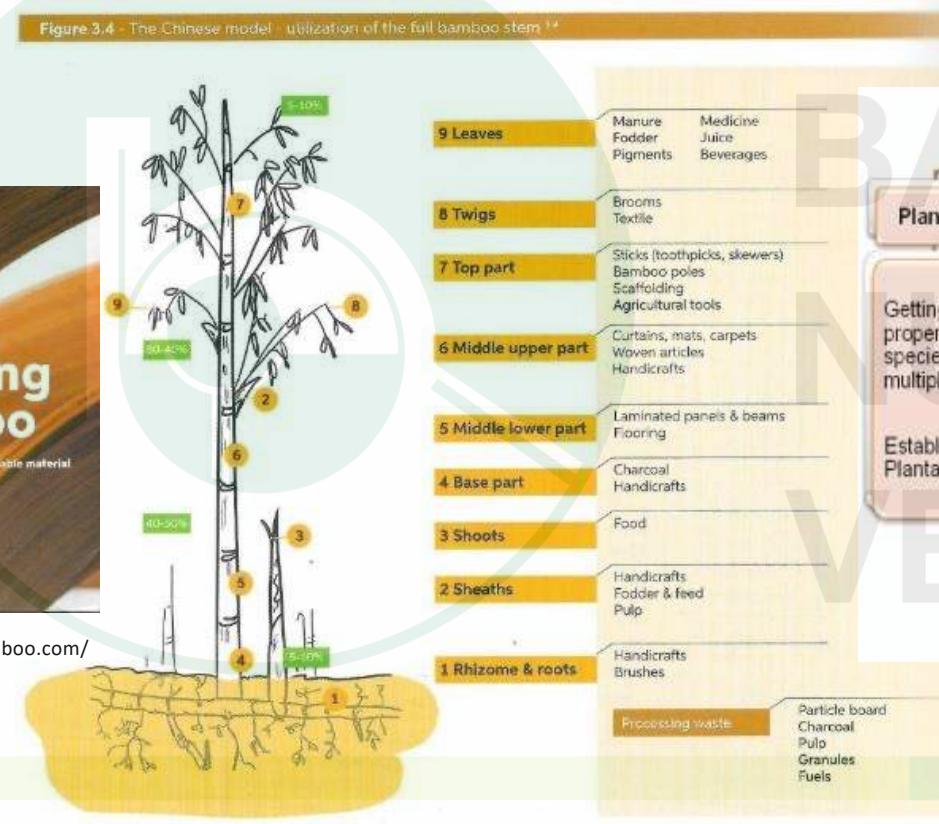
# Sustainable Economy

An estimated 10,000 documented uses of bamboo

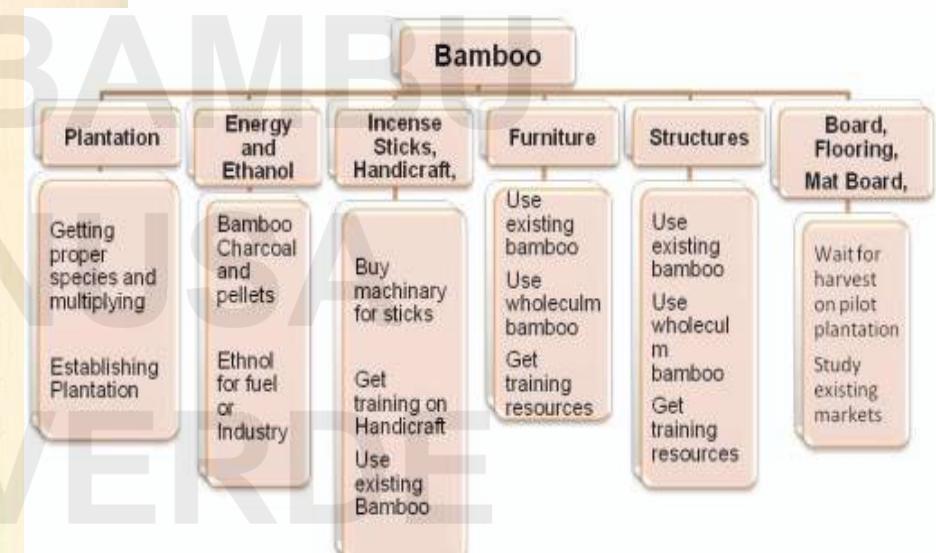
Bamboo as alternative of raw material to decrease and prevent deforestation



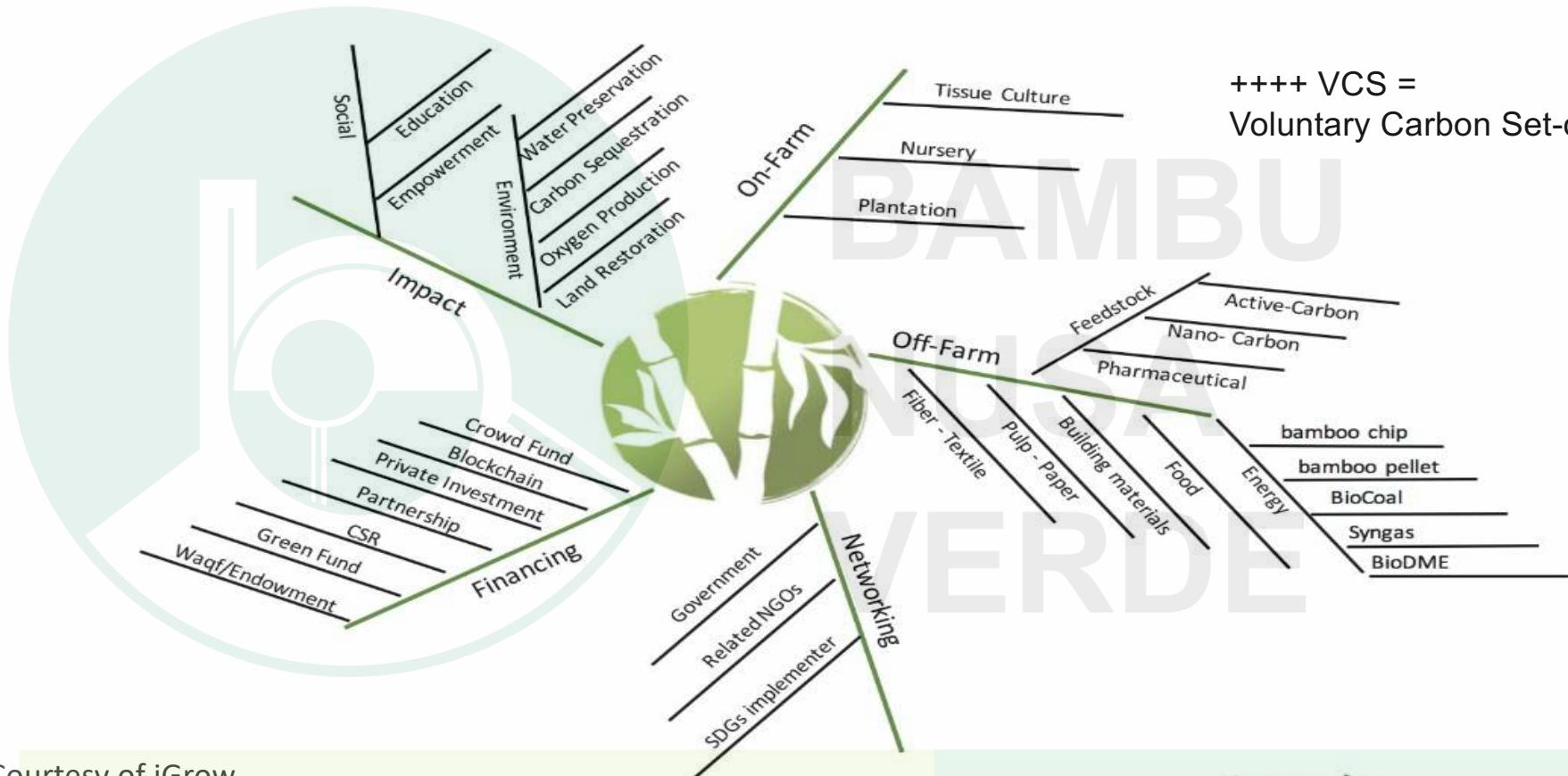
<https://boomingbamboo.com/>



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



# “Green Gold” the BIG Picture





# 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.

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

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

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# 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)).



**BIOSPHERE**  
where life lives

**Lithosphere**

- Reduce soil erosion by 80%
- Build soil organic matter
- Maintain minerals in the land
- Maintain soil fertility
- Support live on land sustainability (SDG 15)



**CLIMATE ACTION**  
**13**



**Atmosphere**

- about 147 tons of CO<sub>2</sub> sequestered by 1 ha bamboo each year
- about 107 tons of Oxygen released by 1 ha bamboo in 1 year
- 1 ha bamboo provide oxygen for 481 people each year
- 1 ha bamboo offset CO<sub>2</sub> released by average 30 people each year.
- Support climate action (SDG 13)

**Hydrosphere**

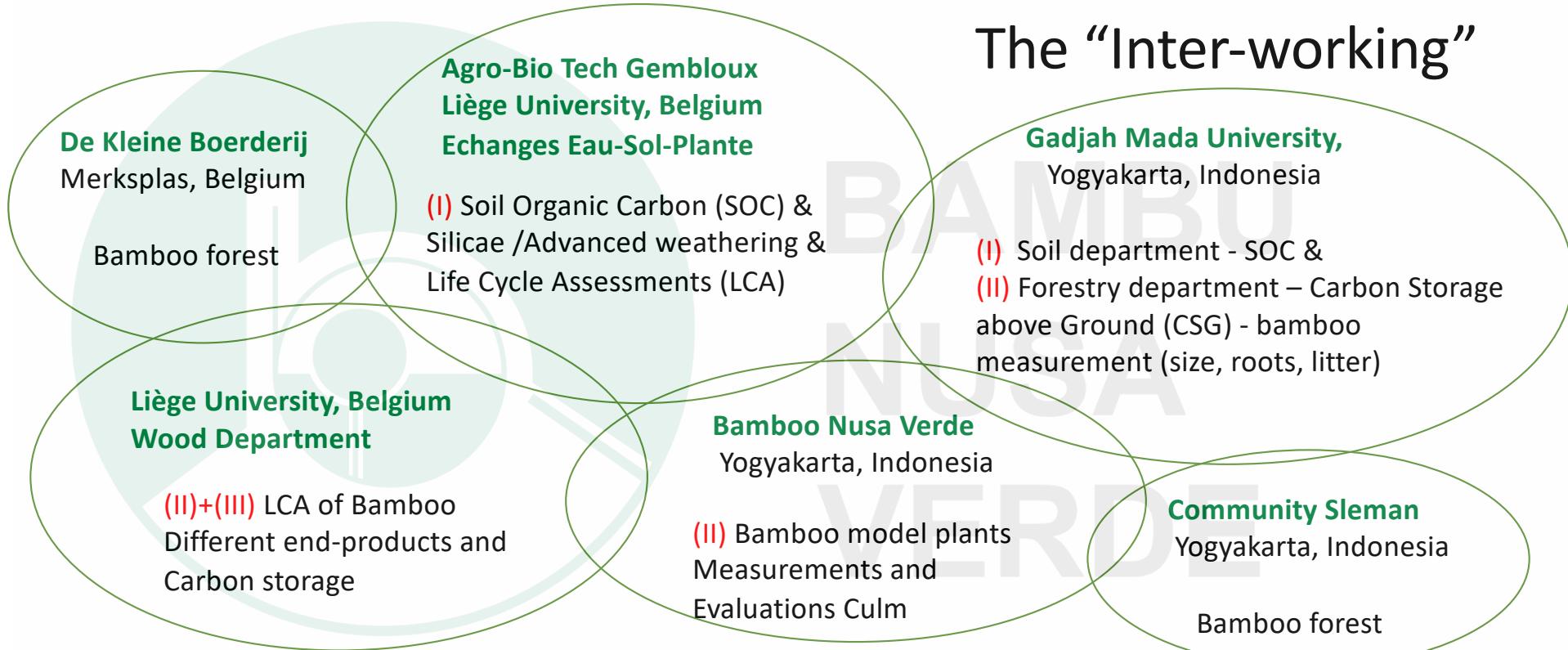
- Increase watertable level, 10 m in 20 years
- Reduce runoff by 25 %
- Improve soil storage of water
- Improve fresh water life, river, swamp etc.
- Support life below water sustainability (SDG 14)

**14** 单位:  
t · hm<sup>-2</sup>



**The carbon storages of ten main bamboo species**

# Research Topics & Parties



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



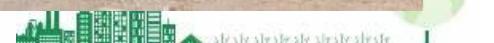
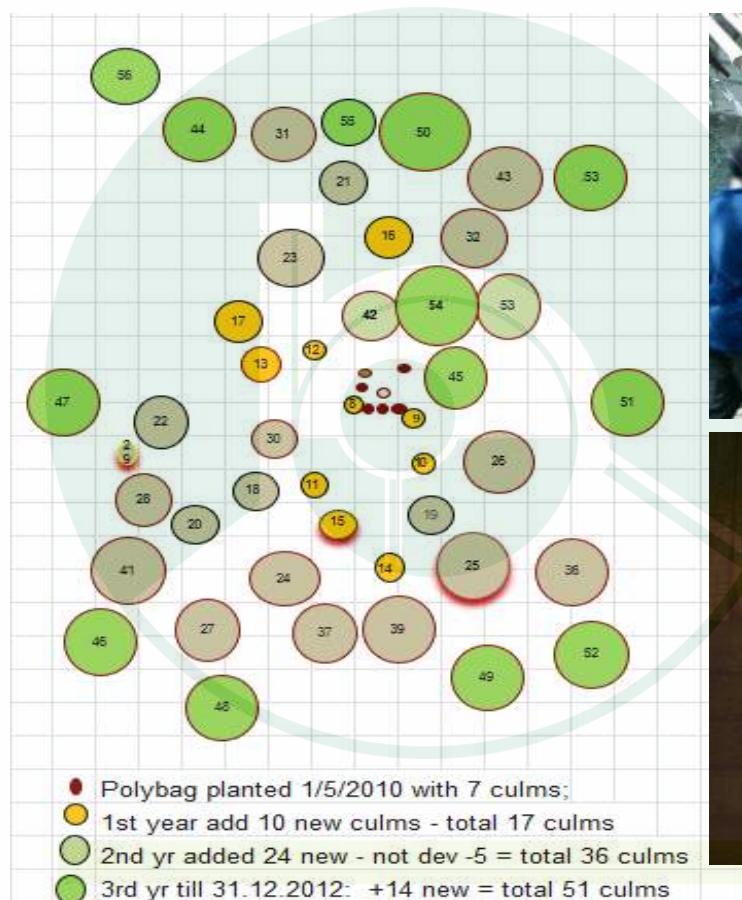
5 Feb 2016



17 Feb 2017



# BBiT Growth



# Carbon storage above Ground

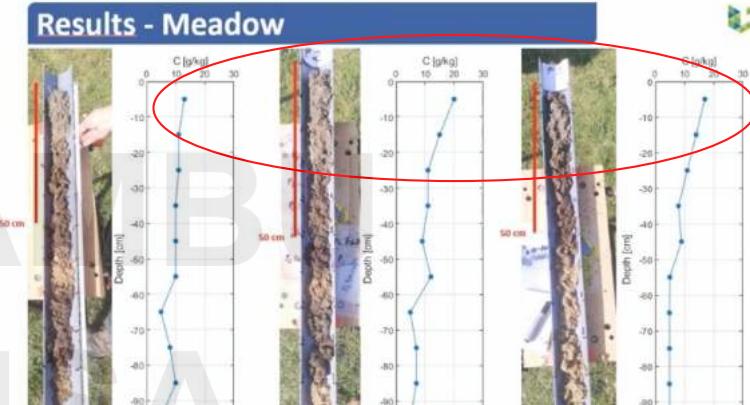


Measurements of different bamboo species and age:  
Growth, clump size, weight, moisture content, litter, ...

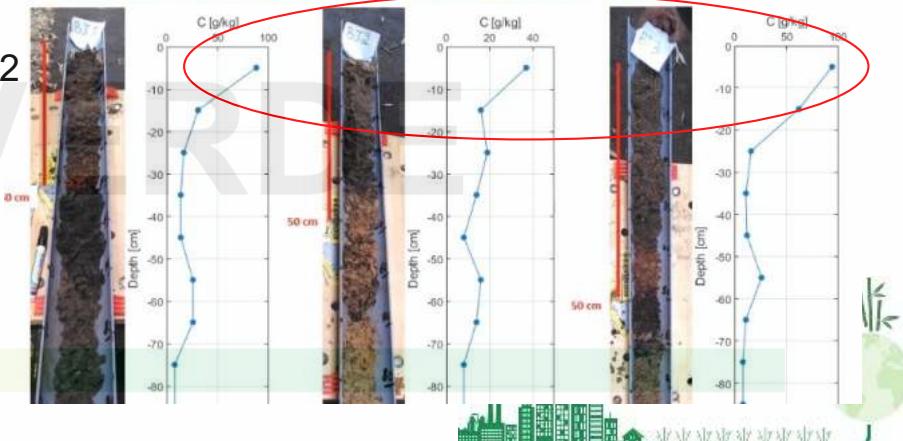
*Dendrocalamus asper*  
*Bambusa balcooa*  
*Bambusa balcooa* var. *Capensis*  
*Bambusa blumeana*  
*Bambusa vulgaris* 'Vulgaris'



# Soil Organic Carbon – (tempered)



## 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)

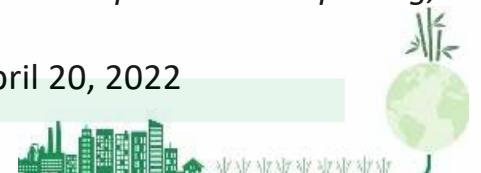


Research by: *Forestry Department of Universitas Gadjah Mada, Yogyakarta, Indonesia*

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

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

Data collection: April 20, 2022





183kg



## *Dendrocalamus asper* Growth measurement

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



# Bamboo Paper is **STRONG**



Mandalay  
Myanmar  
2017



# Seeds – Volcano - Alarm



# Bamboo for Survival



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



Only 3-4 months rain



Paule Island, Mount Rokatenda



Dendrocalamus asper = Bambu Petung/Betung



“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 bambu betung dan bambu aur.



# Our Team



For follow-up:

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[www.bambunusaverde.com](http://www.bambunusaverde.com)  
Telp.: 0274 898 022, 055  
WA/Nisa : +62 815-4281-8729  
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Thanks to the  
TEAM  
to make **THIS**  
Possible





***Bambu from Indonesia for the WORLD***



***Powering the Future***



**THANK YOU**

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# 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\\_ls&t=24s](https://www.youtube.com/watch?v=D_BXknK4_ls&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=OXVIFPIOtM>

**Social Media BNV:**

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

Instagram: <https://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	Rehabilitation mine
23	PT Timah Tbk	Bangka Belitung	
24	PT Arutmin Indonesia	Kalimantan Selatan	
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 collectons
36	PT Berkah Bumi Ciherang	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	Afrifam	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

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