

Bamboo innovations for sustainable biocommodity development

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Outline

- Bamboost conference 2017 Wageningen
- Trilateral bamboo project China, The Netherlands East Africa
- Bamboo markets in Europe
- Bamboo trade and commodities



Bamboost Conference 2017

- At the **bamboost** conference in Wageningen, The Netherlands (25 04 2017), it was shown that bamboo finds a broad range of commercial uses world-wide, ranging from food and feed, handicrafts and tools, high quality building and construction materials to fashionable textiles.
- Bamboo has the potential to become a major biocommodity and may significantly contribute to the ongoing global transition towards the sustainable bioeconomy.

Trilateral bamboo project

- In the trilateral project (China, Netherlands and East Africa) development of bamboo production technologies is aimed for.
- This requires innovations and improved ecological biorefining technologies, adapted to the local infrastructure, to supply the diversity of markets, as well as the logistic organization of tradable feedstock and products.
- Integration is important of the whole production chain to sustainably supply biobased industries with sufficient quantities and qualities of bamboo feedstock.

Session 1 - Bamboo diversity and versatility



- 08:45-09:00 h Tjeerd de Vries, Ministry Foreign Affairs of the Netherlands - Kick off Bamboost 2017
- 09:00-09:15 h Hans Friederich, INBAR - International development and the Bamboo triangle project
- 09:15-09:30 h Nellie Oduor, INBAR & KEFRI - Kenya Bamboo Project
- 09:30-09:45 h David Modijefsky, European Bamboo Society - Bamboo growing and production in NW Europe
- 09:45-10:00 h Ruud Goedknecht and Joep Meester, Barbarugo - Planting bamboo in the savanna's of Ghana
- 10:00-10:15 h Alex van Nifterik, Van Nifterik Holland bv - Bamboo uses in horticulture

Session 2 - Bamboo Textiles, fashion and design



- 10:40-11:00 h Coosje Hoogendoorn, KIT – Sustainable development of commodity supply chains
- 11:00-11:20 h Dr André Lehmann, Fraunhofer - Current and emerging technologies for man-made cellulosic fibers
- 11:20-11:40 h Peter Koppert, Modint - Sustainability criteria for textiles and fashion
- 11:40-12:00 h Simon Kos, Katja Buturlina, Royal bamboo – Timeless bamboo eco fashion
- 12:00-12:20 h Jayaraman Durai, INBAR - Multilateral Dutch-Sino East Africa Bamboo Development programme

Session 3 - Bamboo in building applications: from poor man's timber to design



- 13:20-13:40 h Arjan van der Vegte, MOSO- High end architectural applications of engineered bamboo products
- 13:40-14:00 h Stefan Krötsch, TU Kaiserslautern - Building with bamboo - an ecological alternative for Kenya
- 14:00-14:20 h Anna Caterina Rossi, ISO - Bamboo becomes international with ISO standards
- 14:20-14:40 h Marc Bokeloh, Bambooder - High performance bamboo composites
- 14:40-15:00 h Jiang Jingyan - The innovation and co-production of bamboo industry development in Yong'an CHINA
- 15:00-15:20 h Pablo van der Lugt, MOSO - Bamboo LCA, carbon footprint and sustainability

Session 4 - Bamboo in Food and Health Industry

- 15:40-16:00 h Pedro Fardim, KU Leuven and Carmen Boeriu, WFBR - Bamboo in health and cosmetics
- 16:00-16:20 h Liangru Wu, Jinlai Yang, China National Bamboo Research Center - Bamboo Shoots Sector In China: Encountering A Great Opportunity With Some Challenges
- 16:20-16:50 h Anke Janssen and Nam-Phuong Hua, WFBR - Bamboo food ingredients on the European market
- 16:50-17:10 h Bas Dunnewijk, Rettenmaier - Application of Bamboo fibres as nutritional and functional ingredient in food
- 17:10-17:30 h Jan van Dam, WFBR - Conclusions and wrap up - Bamboo and bio economy

Commercial uses of bamboos



- horticultural support sticks
- plaiting
- tools and utensils
- construction and composites materials, (flooring, plywood, veneer and laminated bamboo)
- furniture, furnishings
- pulp, paper and boards,
- textiles and tissues
- food and feed products, (shoots, dietary fibre, leave teas, beverages)
- energy (combustion), charcoal

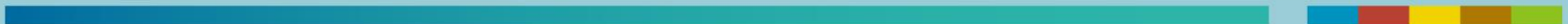
International Harmonized System codes (HS codes) of bamboo products



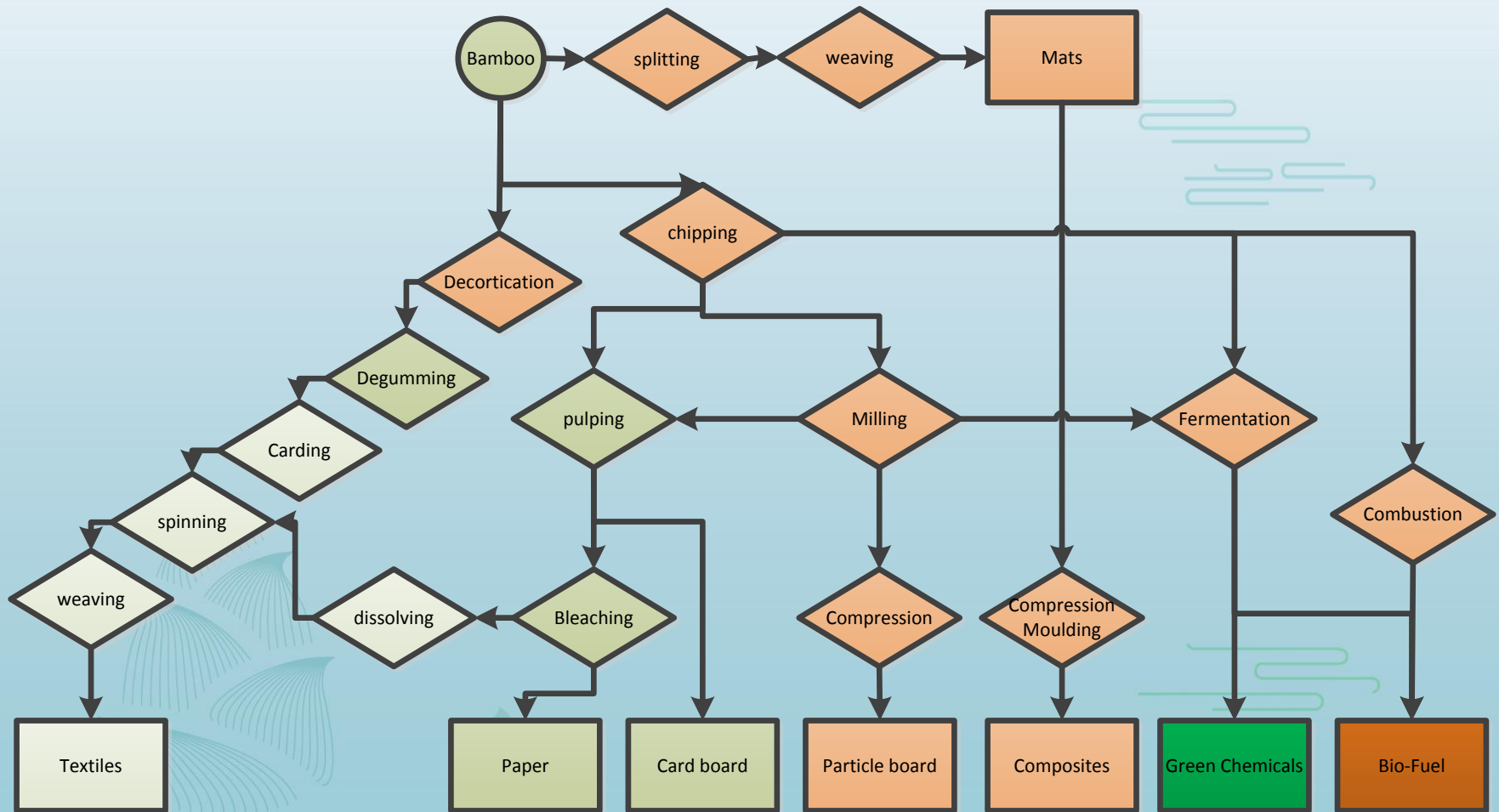
category	HS code	product
vegetable plaiting materials	14 0110	bamboos
vegetable food preparations	20 0591	bamboo shoots
Wood and articles of wood	44 0210	bamboo charcoal
	44 0921	bamboo flooring
	441210	plywood, veneer and laminated bamboo
Manufactures of plaiting materials	46 0121	bamboo mats/ matting/ screens
	46 0192	bamboo plaits
	46 0211	bamboo basketwork
Pulp of wood or of other materials	47 0630	bamboo pulp
Paper and paper products	48 2361	bamboo paper articles
Furnishings	94 0151	seats of bamboo and rattan
	94 0381	furniture of bamboo and rattan

Bamboo raw materials

- Bamboo has been developed as feedstock for high-end commercial products for export
- Residues and inferior qualities are used for lower-value bulk processing.
- This cascading principle ensures maximum use of available feedstock, with optimal benefits for rural economies, industries and the environment alike.



Bamboo processing for different markets



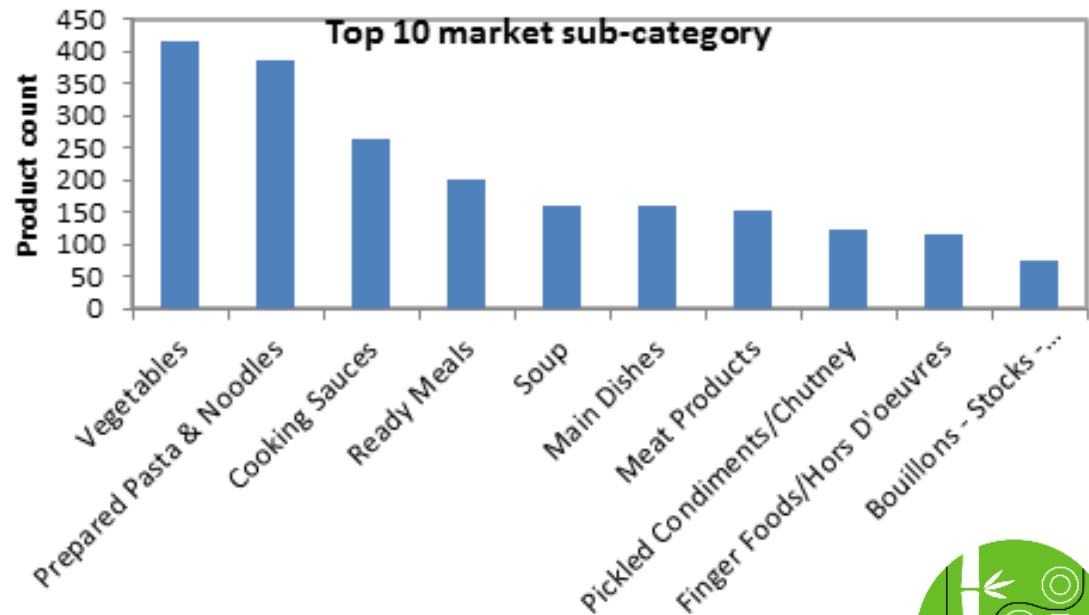
Bamboost topics



- **Bamboo** in food and health products

- Sub categories Innova Food and Beverage Database:

- Bamboo shoots vegetables
- Bamboo dietary fibre additives
- Health products

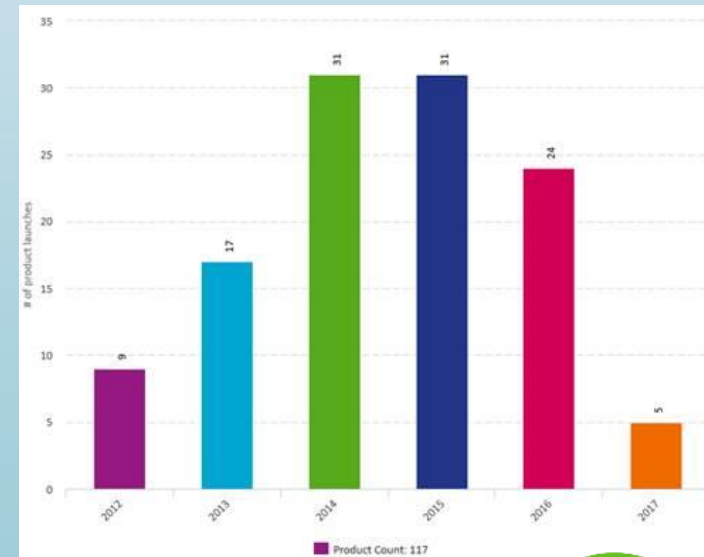
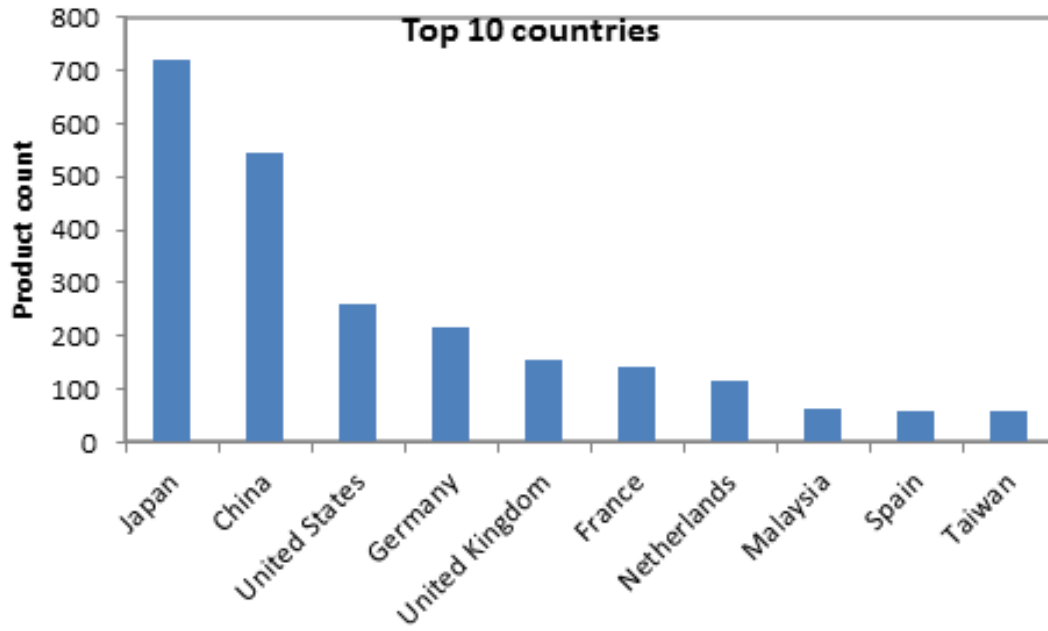


Bamboost topics



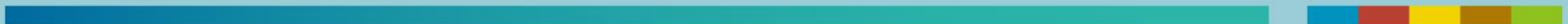
- **Bamboo in food and health products**

- The Netherlands among countries with significant number of bamboo products on food market
- Consumer acceptance of new bamboo foods?



Bamboo for textiles

- High quality bamboo textiles are entering the EU market
- Concern about ecological footprint of textile production
- Alternatives for cotton needed
- Innovation for eco-friendly bamboo yarn production is of high importance



World market

- The world market for commercialized bamboo products has grown fast and, may be worth 60 billions of US\$.
- It is expected that prospects for bamboo markets are good and expanding (INBAR).
- Bamboo is quickly becoming a popular feedstock for commercial products such as **flooring, furniture, plywood, pulp, paper, textiles, building materials** and other products.
- Currently, 80% of bamboo products are produced China, particularly in 10 counties of China's southeast.

Bamboo potential

- Sustainable feedstock in the bio-based economy, for energy, chemicals and materials sectors.
- Poverty alleviation and livelihood development in producing countries.
- Remediation of degraded soils
- Bamboo as biofuel for large scale combustion processes requires addressing high ash content and critical ash composition (K, Na Cl) by
 - a) removal of critical elements by washing (hydro-thermal)
 - b) utilization of additives..

Advantages - disadvantages

- Bamboo has advantages over other lignocellulosic feedstocks such as: high productivities (10-40 ton/ha-year) and higher biomass densities (400-900 kg/m³).
- Disadvantages are cost of selective harvesting which are higher than for other biomass feedstocks allowing for clear cutting and mechanization. However, manual harvesting activities creates local jobs and income for the rural population.

Diversification

- Increased value of bamboo through cascading effects.
- Bamboo flooring uses only the middle lower sections of bamboo. The remainder parts are sold by farmers to other factories where they make toothpicks, chopsticks, curtains, scaffolding, charcoal and other products. This enables local farmers to increase the value of their bamboo with a factor 2 to 3.
- Fibre and chemical based industries can be supplied with lower grade bamboo qualities, such as in the manufacturing of paper, pulp, textiles, biobased plastics and fine-chemicals.

Promotion of international cooperation between experts and stakeholders of many disciplines will be required to convert bamboo to a sustainable commodity for future generations.

THANKS

