Potential of Bamboo based Food and Beverages for Export: Standarization and Safety

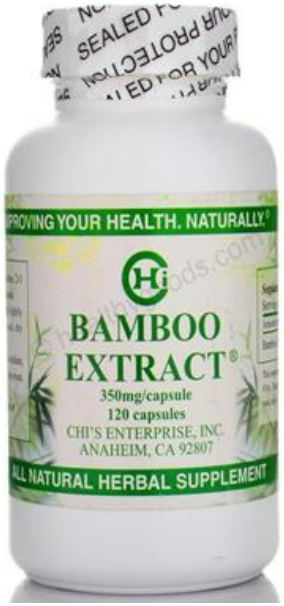
Prof. Nirmala Chongtham
Department of Botany &
Coordinator, DST, Centre for Policy Research
Panjab University, Chandigarh

WORLD BAMBOO
AMBASSADOR

Bamboo as…..

FOOD

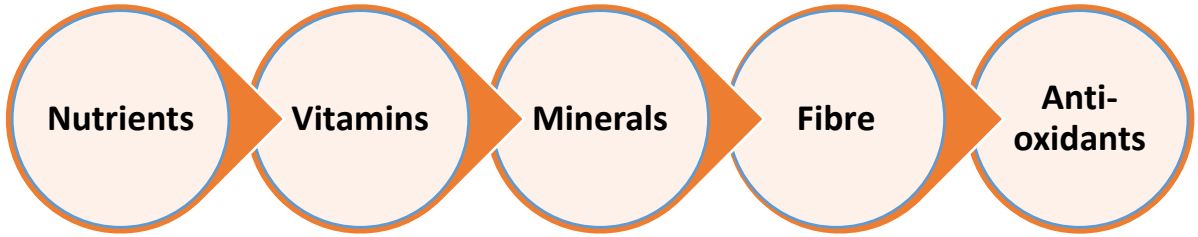
MEDICINE

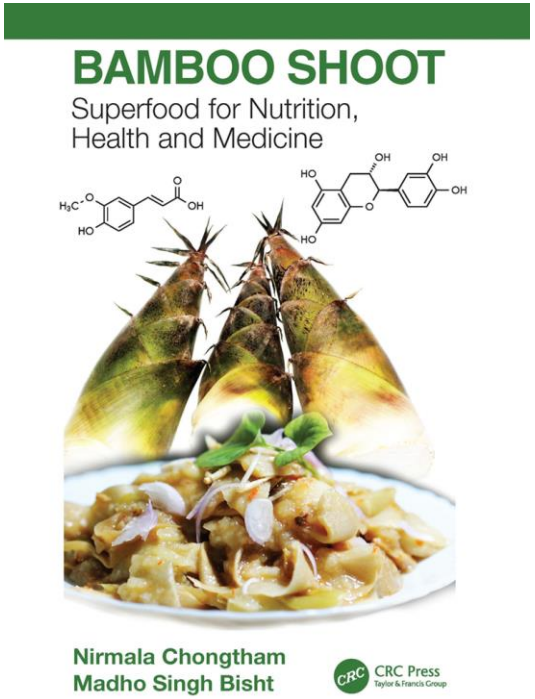


…..is the most neglected part

Superfood

Bamboo shoots fulfil the most important criteria for being considered as a **Superfood**





Health beneficial properties include weight loss, improving digestion, lowering cholesterol level and preventing a number of diseases

Traditional knowledge has now been validated by scientific interventions

Bamboo shoots with all properties of a superfood can be used as a vegetable, food additive and as an ingredient for the pharmaceutical, nutraceutical and food industries.

Bamboo shoot nutrition

- Juvenile shoots are

❖ Rich in proteins, carbohydrates, amino acids, minerals, vitamins

❖ High content of minerals like K, P, Mg, Na, Fe, Ca and Se.

❖ Rich in dietary fibers, phenols, phytosterols

❖ Low in fat and sugar.

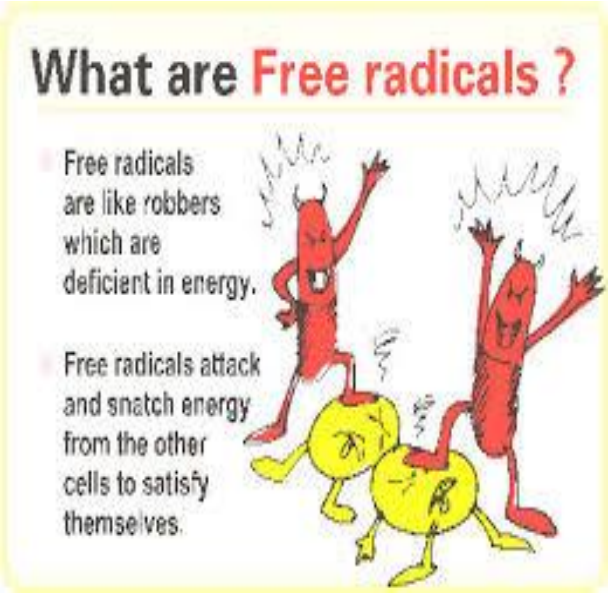
Fig.1. a. freshly harvested shoots; b. peeled shoots; c. Sliced shoots.

Antioxidants

Substance that neutralizes free radicals or their actions

Decreases the adverse effects of reactive oxygen species (ROS)

Dietary antioxidants in shoots are vitamin C, vitamin E, and phenols



BAMBOO SHOOTS AND HUMAN HEALTH

Sl.No.	Potential Activities on Human Health	Reference
1.	Antioxidant and anti-inflammatory effects of bamboo shoot extracts	Hu et al. (2000); Lu et al. (2005)
2.	Antimicrobial and anti-fungal activities of bamboo shoot	Fujimura et al. (2005)
3.	Protect neurons from oxidative stress	Akao et al. (2004)
4.	Anti-apoptotic activities of bamboo shoot	Hong et al. 2010
5.	Anti-cancer, anti-bacterial, anti-viral activity of bamboo shoot fibre	Shi and Yang (1992); Fujimura (2005), Tanaka et al (2013)
6.	Cholesterol lowering properties	Park and Jhon (2009)
7.	Anti-fatigue activity	Zhang et al (2006)
8.	Prevention of hypertension	Liu et al., 2013
8.	Anti-diabetic properties	Koide et al 2011, Nam et al., 2013

Bamboo in a new Avatar

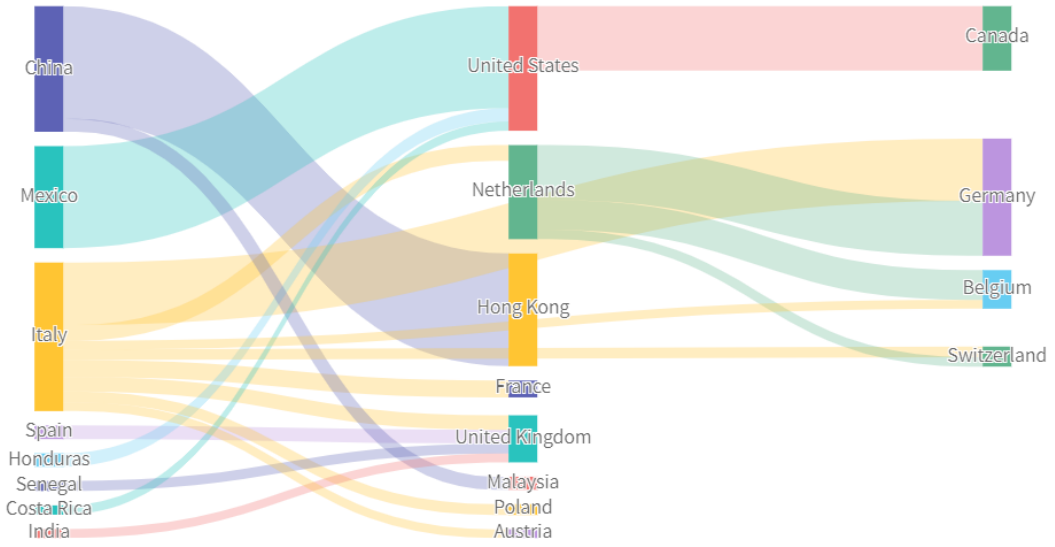
Global perspective of Bamboo shoots

China is the top exporter of bamboo shoots, accounting for 87% of the entire export market

Japan, USA and EU are the topmost importing countries, collectively making up around 95% of the total global import.

The top export flow in 2020 was from China to Hong Kong, with an export value of USD 261.64M.

Trade Flow	Export Value
China to Hong Kong	$261.64M
Mexico to United States	$236.96M
United States to Canada	$149.90M
Italy to Germany	$144.76M
Netherlands to Germany	$127.35M
Netherlands to Belgium	$69.22M
Italy to France	$39.20M
Italy to Netherlands	$36.84M
India to UK	$20.84M



Source-https://www.tridge.com/intelligences/bamboo-shoots/export

Present status, gaps and challenges

North-East Indian region has a total of 24110 km2 area covered with bamboos from where annually 5685 tons of shoots are harvested with an estimated worth of INR 26.96 million (US$ 0.43 million)

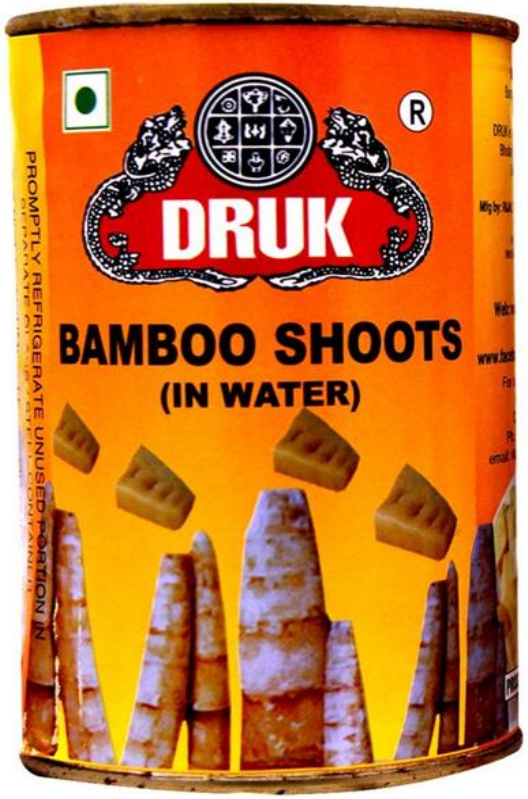
Small scale bamboo shoot handling units established in Aizawl (Mizoram), Jorhat (Assam) and Dimapur (Nagaland) areas of North–East India, are not sufficient enough to provide services even to the local market.

India imports bamboo shoots from other countries like Thailand and Bhutan which are available not only big cities like Delhi and Chandigarh but even in the North Eastern states during the monsoon season when fresh shoots are available

Fresh shoots cost INR 30 - 60/ kg which is cheaper than the imported canned shoots for half of the weight ranging from INR 150–170 /500g pack or Rs. 300 – 340/kg

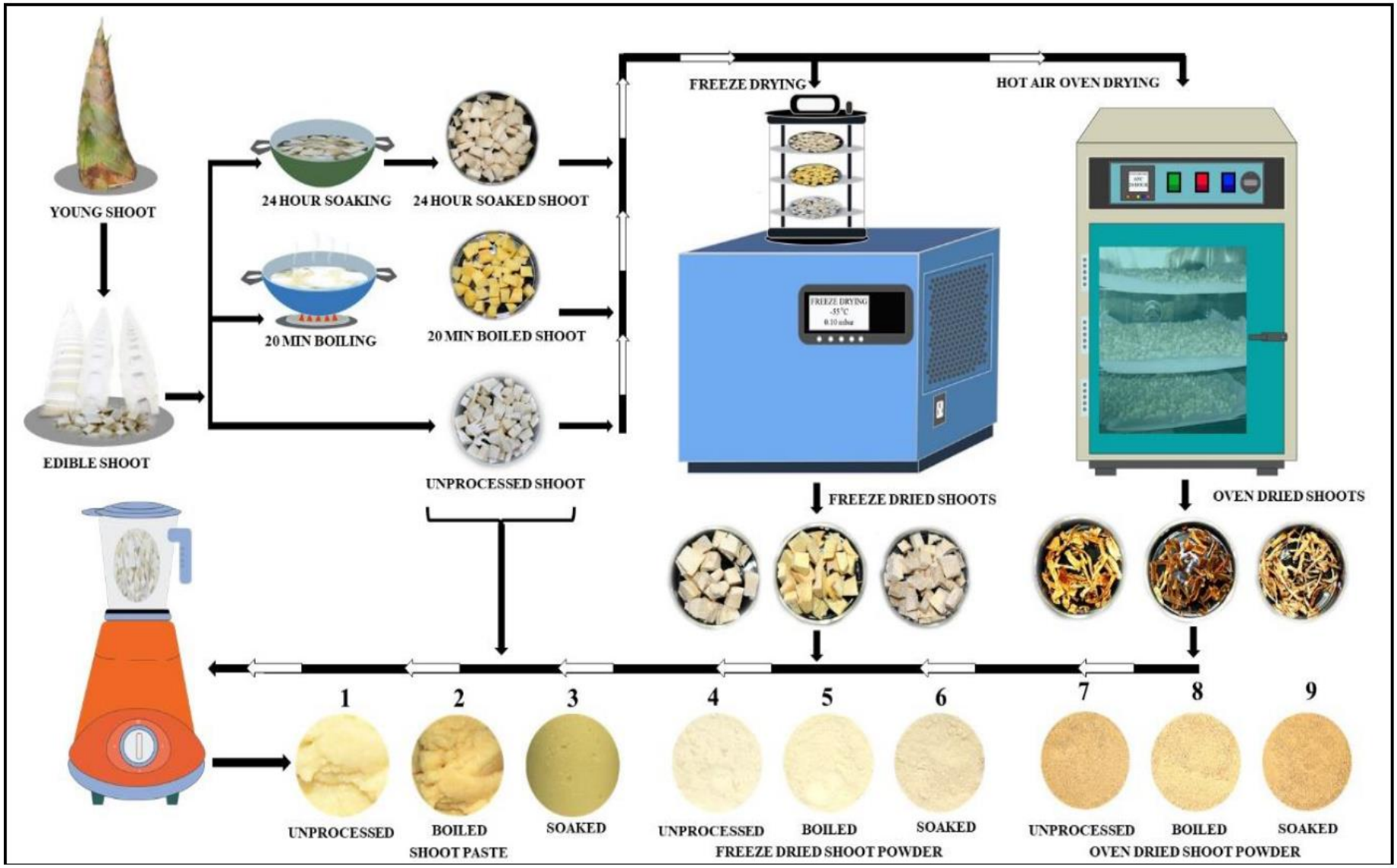
Imported bamboo shoots available in India

Net Weight: 425 g
M.R.P.: Rs. 170/-

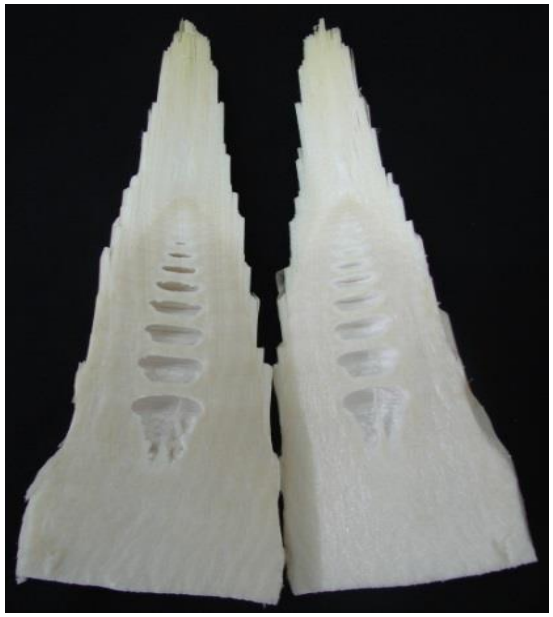


Net Weight: 450g
M.R.P.: Rs. 150/-

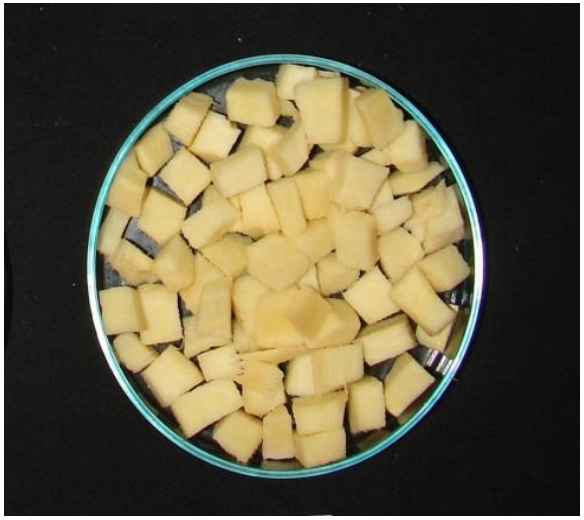
Bamboo Shoot Processing



Removal of culm sheaths



Peeled shoots



Boiled shoots,

Soaked shoots,

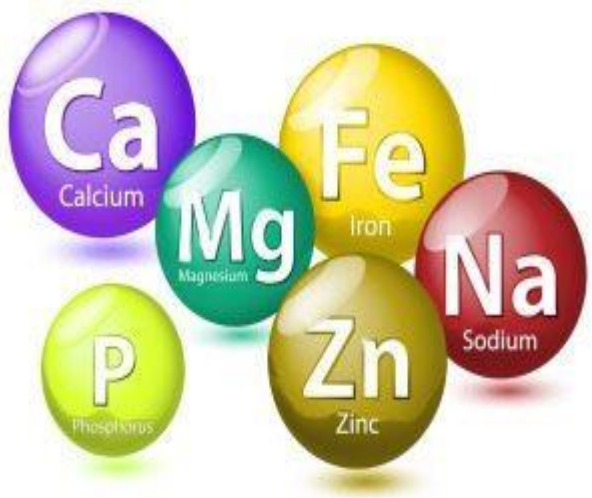
Fermented shoots

Packaging


BAMBOO SHOOT
1 kg


FÁBRICA DE DOCES LEDUR LTDA. - RUA DA EMANCIPAÇÃO, 2187 -
BAMBU PARA TODOS:
TRABALHO E RENDA
BROTO DE BAMBU
PRODUZIDO NO:
CENTRO DE FOMENTO DO BAMBU


Bambusa
Brotes comestibles de bambú
Bambusa
Brotes comestibles de bambú

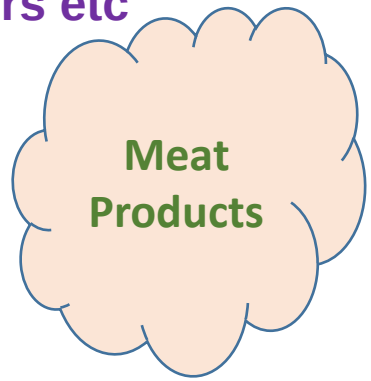


Bamboo shoots with high nutrient content and phytochemicals are potential ingredients for food fortification and pharmaceuticals

Bamboo as a Functional Food

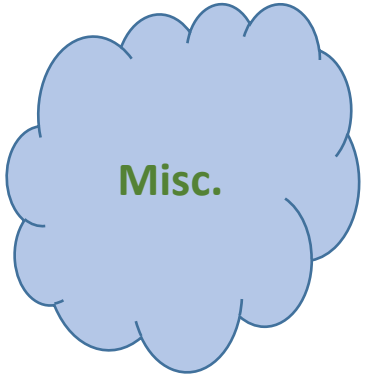
Bread, pretzels,
cookies,
ice cream cones,
cakes,
Wafers etc

Milk, yogurt,
ice cream,
cheese



Chicken, pork

Tea, soft
drinks,
juices



Sauces, ketchup,
Pasta, noodles,
Mustard,
nuggets,
Chocolates

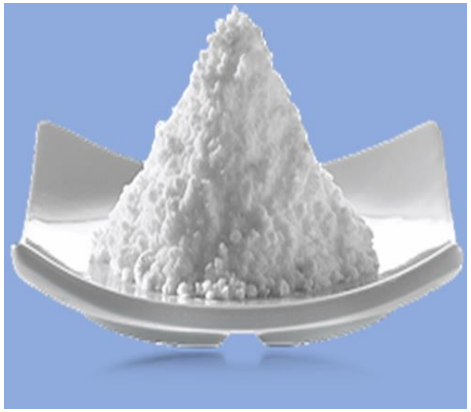
Bamboo fortified food products

Bamboo shoot fortified shoot products

Bamboo salt

- Prevention or treatment of inflammatory diseases.
- Helps purifying blood thus lowering the risk of blood pressure.
- Assists the absorption of calcium and maintains fluid balance
- Calcium, magnesium and silica are good for bones skin and hair

Dietary fibre from Bamboo



Bamboo dietary fiber is inert, has zero calories and is a white tasteless powder; the content of dietary fiber can be up to 75%

Application:

Food additives

Slimming food supplements

Weight loss food

Medicine

BAMBOO

BAMBOO WATER™

Vincent Villanis
Bamboo Beverage Limited, Canada

Bamboo leaf Tea

Bambusa sps.
Sasa sps
Phyllostachys sps.

Bamboo Beer

Mauricio Mora Tello, MEXICO

Bamboo wine

Fermentation of shoots of bamboo *Oxytenanthera abyssinica* or *Oxytenanthera braunii* or by soaking bamboo leaf in white wine or ethanol or fermenting with starchy food materials.

The alcohol percentage ranges from 38-46%

Tapping the bamboo to check that the alcohol is ready for sale

Phytochemicals in Bamboo leaves

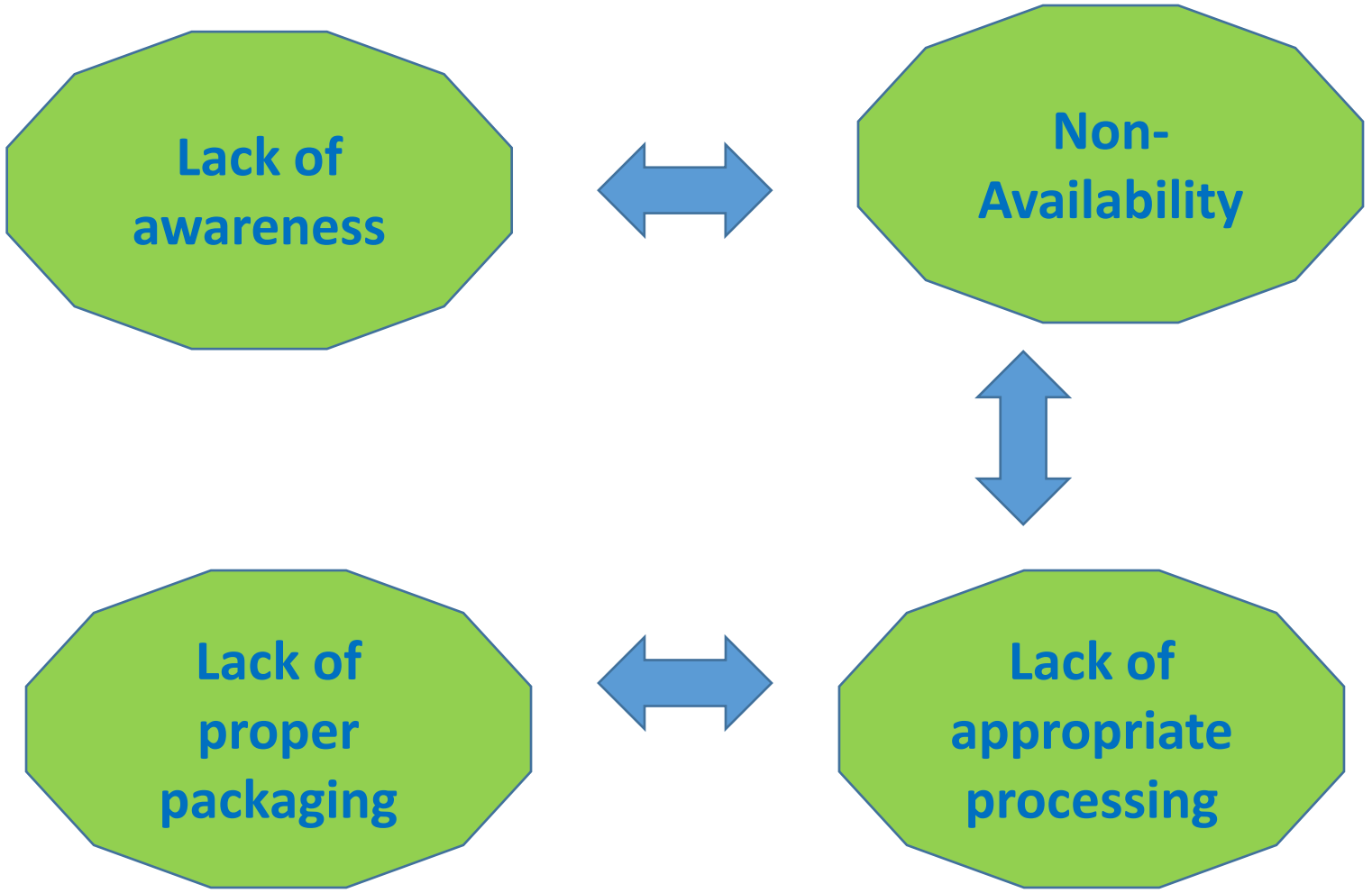
Species	Total phenols (mg/100g)	Flavonoid (mg/g)	Vitamin C (mg/100g)	Vitamin E (mg/100g)	Phytosterol (g/100g)	Tannin (g/100g)
Bambusa balcooa	906.02 ± 0.009	73.59 ± 0.005	12.96 ± 0.041	13.06 ± 0.002	13.19 ± 0.017	32.42±0.005
B. nutans	**1475.03 ± 0.012**	101.70 ± 0.008	**18.51 ± 0.036**	16.07 ± 0.003	11.76 ± 0.007	14.90±0.003
B. polymorpha	795.51 ± 0.005	**37.33 ± 0.007**	14.68 ± 0.009	**9.60 ± 0.006**	**4.16 ± 0.004**	40.73±0.007
B. tulda	897.80 ± 0.007	106.27 ± 0.0007	**9.97 ± 0.006**	**21.88 ± 0.003**	10.02 ± 0.006	12.86±0.006
B. vulgaris	1059.01 ± 0.002	74.07 ± 0.007	10.57 ± 0.005	18.14 ± 0.003	8.00 ± 0.003	16.50±0.001
Dendrocalamus asper	**731.58 ± 0.006**	69.22 ± 0.002	16.50 ± 0.020	16.87 ± 0.002	7.63 ± 0.002	**11.49±0.001**
D. hamiltonii	890.95 ± 0.003	96.62 ± 0.010	17.92 ± 0.005	14.09 ± 0.003	9.37 ± 0.004	24.23±0.003
D. strictus	1002.84 ± 0.005	**119.92 ± 0.028**	14.86 ± 0.023	21.59 ± 0.007	**16.41 ± 0.003**	31.97±0.001
D. membranaceous	1051.24 ± 0.003	89.48 ± 0.005	13.44 ± 0.010	14.32 ± 0.006	9.39 ± 0.005	**41.30±0.004**
D. giganteus	871.77 ± 0.005	107.70 ± 0.010	13.56 ± 0.003	20.47 ± 0.004	13.07 ± 0.001	**11.49±0.002**
Thyrsostachys siamensis	1157.65 ± 0.004	76.33 ± 0.011	17.01 ± 0.011	12.11 ± 0.005	8.36 ± 0.003	11.95±0.002

Major Edible Bamboo species in different regions of India

Region	Names of the species
North East India	*Bambusa balcooa, B. cacharensis, B. nutans, B. tulda, B. vulgaris, B. manipureana, B. polymorpha, Chimonobambusa callosa, Cephalostachyum capitatum, Dendrocalamus giganteus, D. hamiltonii, D. latiflorus, D. sikkimensis, D. hookeri, D. longispathus, Melocanna baccifera, D. manipureanus, Phyllostachys mannii, Schizostachyum dulloa, Teinostachyum wightii*
Central India	*B. bambos, B. nutans, B. tulda, Dendrocalamus giganteus, D. hamiltoni, D. strictus, Gigantochloa albociliata*
East India	*Bambusa balcooa, B. nutans, B. tulda, B. vulgaris, D. sikkimensis, D. strictus, Gigantochloa albociliata, Melocanna baccifera*
Southern India	*B. bambos, B. longispiculata, B. nutans, B. polymorpha, B. tulda, B. vulgaris, Cephalostachyum capitatum, C. pergacile, Dendrocalamus giganteus, D. hamiltonii, D. hookeri, D. longispathus, D. strictus, Melocanna baccifera, Oxytenanthera albociliata, Sinobambusa elegans*

Why is bamboo shoot a neglected food item in India ?

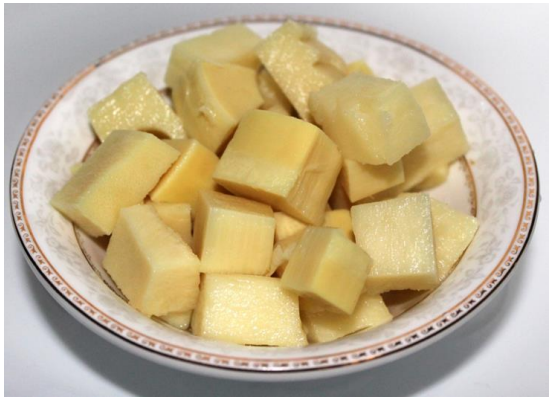
Bamboo shoot is considered as a vegetable for the rural people and marketed at the local level



Shoots available in the market and their cost

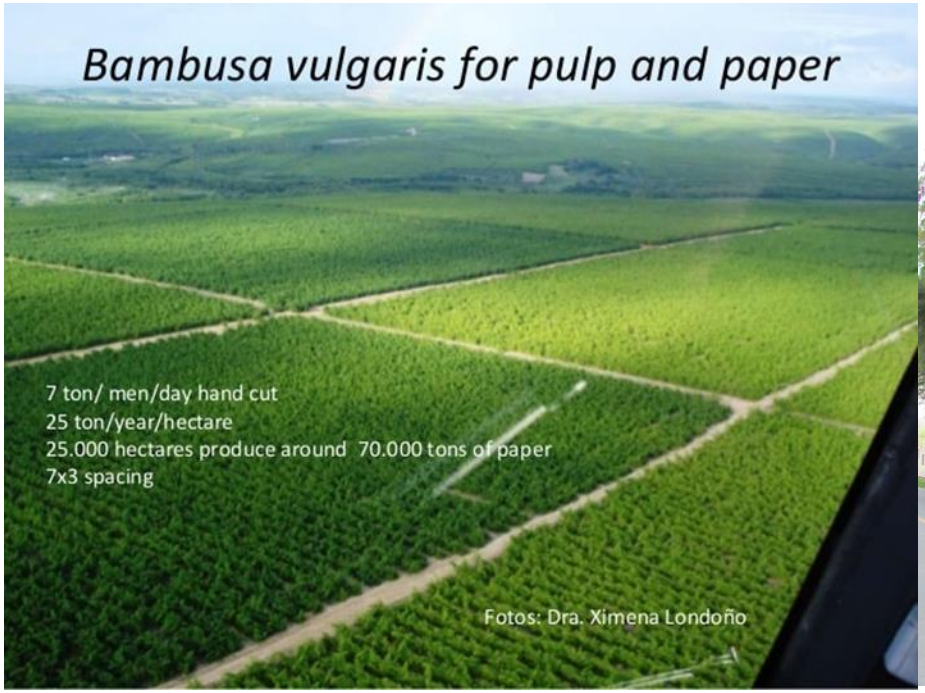
Shoot Form	Species	Price (Rs/kg)
Fresh shoots	*Bambusa nutans*	50-60
	B. tulda	30-40
	Cephalostachyum capitatum	40-50
	Chimonobambusa callosa	50-60
	Dendrocalamus hamiltonii	30-40
	D. hookeri	40-50
	D. latiflorus	40-50
	D. longispathus	30-40
	D. sikkimensis	35-45
	Melocanna baccifera	30-50
Fermented shoots	*D. hamiltonii*	80-120
	C. capitatum	100-200

Challenges associated with commercialization

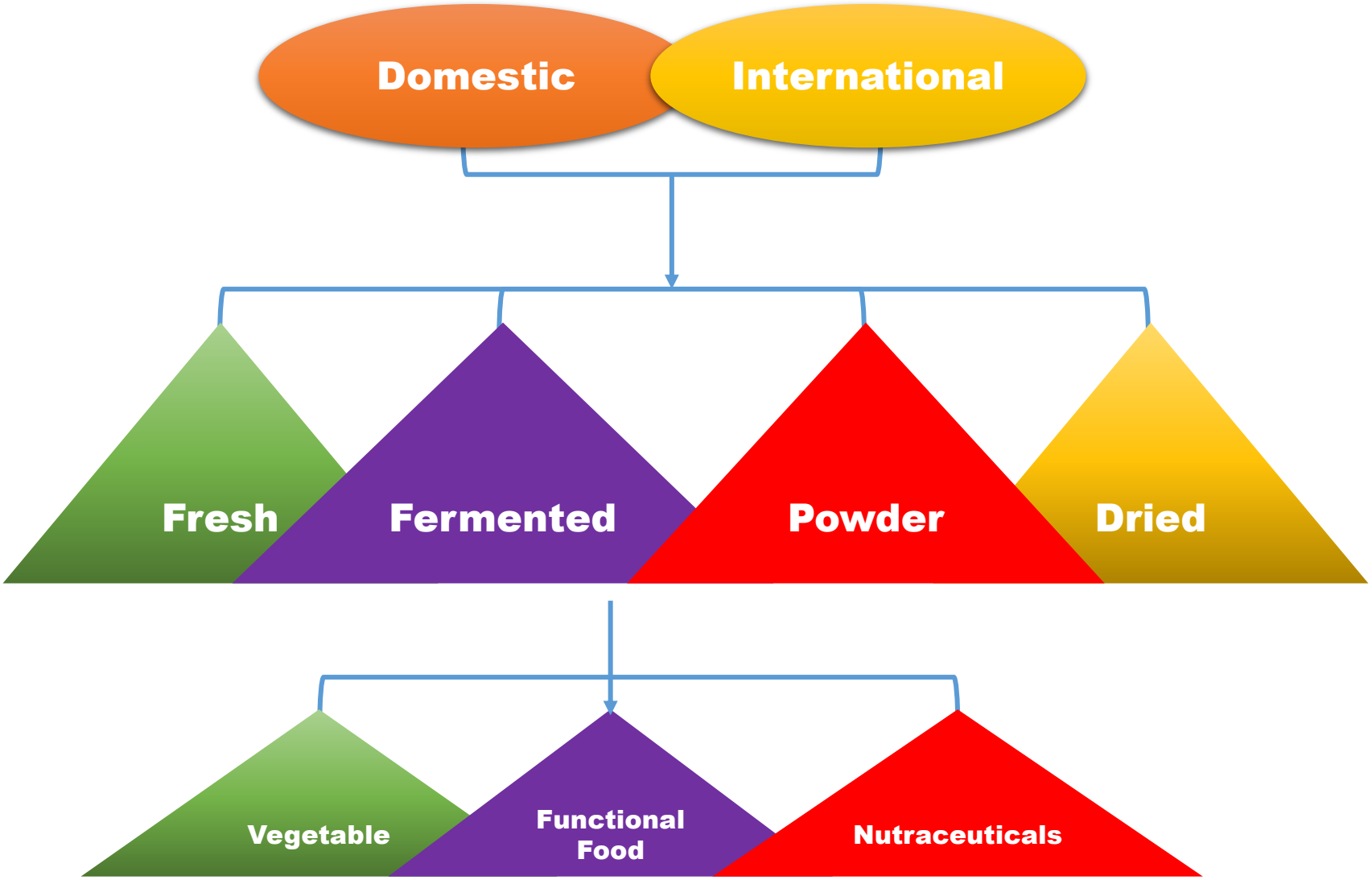


1. Selection of appropriate species
2. Raw material: Plantation of appropriate bamboo species
3. Large scale micro- or macro- propagation.
4. Development of appropriate processing and packaging technique
5. Proper equipped laboratory to analyze the shoots and fortified food products to maintain quality
6. A dedicated nursery for raising proper planting material and land for plantation to run a viable bamboo shoot industry

Plantation on large scale is necessary



Market Levels



To start a bamboo shoot industry, one cannot depend only on natural resources.

Shoots are available for 4-5 months depending upon the species. Extensive plantation is necessary to provide raw material.

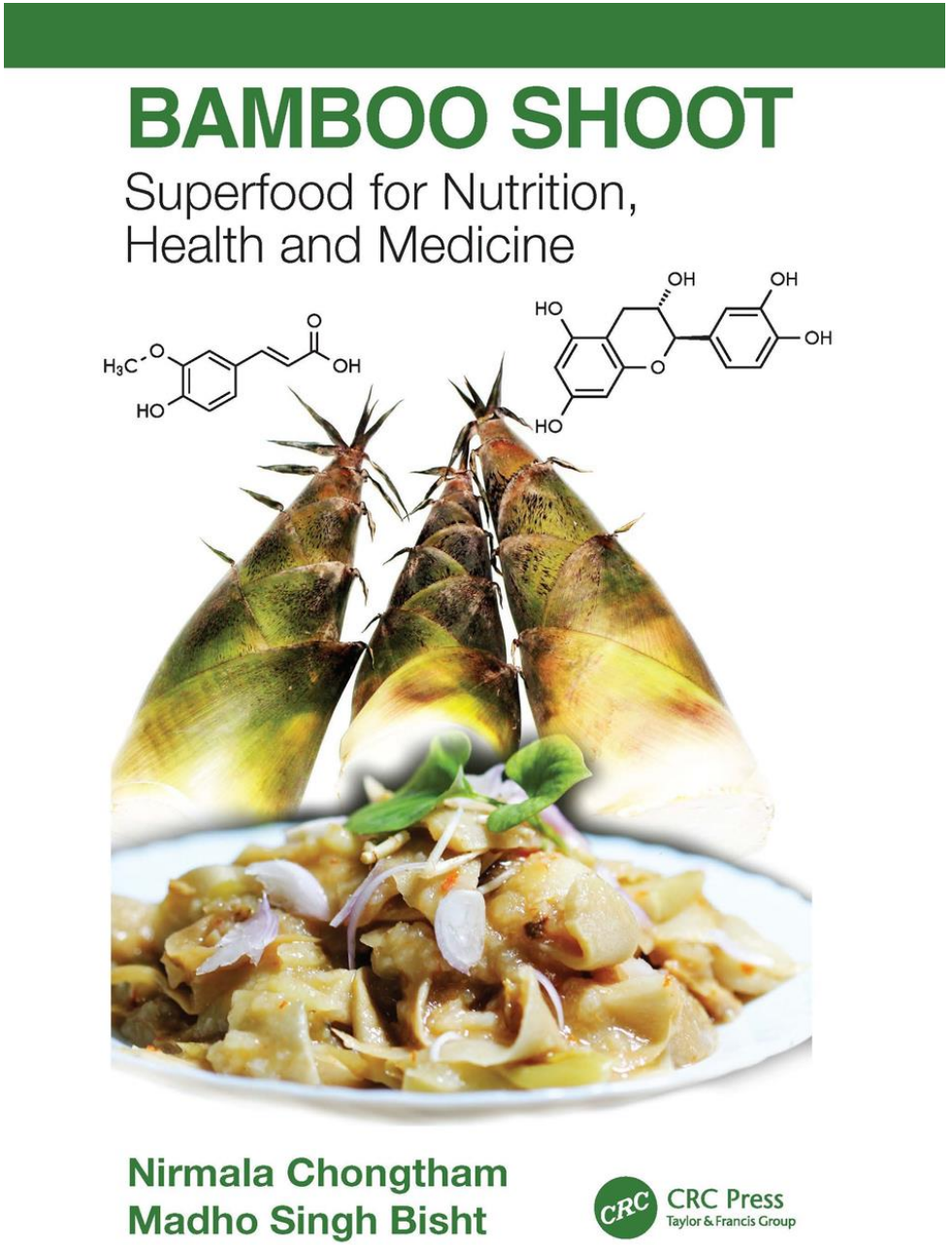
Proper storage conditions are necessary

Selection of appropriate packaging material of the finished products

Additional utilization of the non-edible culm sheaths can be worked out such as extraction of bioactive compounds to be used in the pharmaceutical industries, decorative items, disposable plates etc.

India has a golden opportunity to enter the international market and has tremendous potential of setting up a viable bamboo shoot industry and enabling socio-economic development of the people of this region.

Compilation of 20 Years of Research



Thank You

Eat Bamboo shoots and be Healthy!

Nirmala Chongtham

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