Bamboo Industrial Processing in India

Dr BN Mohanty, IFS,
Director IPIRTI

INDIAN PLYWOOD INDUSTRIES RESEARCH & TRAINING INSTITUTE
BANGALORE
Bamboo is a woody perennial grass (family: *Poaceae*). Bamboo omitted as “Tree” under Indian Forest Act (1927).
BAMBOOS IN INDIA

• There are 125 species of bamboos in India spread across 18 genera

• Bamboos available in 15.4 million hectares in India

• Sympodial bamboo consists of 67% of growing stock

• Monopodial bamboo comprises of 20% of growing stock

<table>
<thead>
<tr>
<th>Bamboo Species</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Dendrocalamus strictus</td>
<td>45%</td>
</tr>
<tr>
<td>Melocanna baccifera</td>
<td>20%</td>
</tr>
<tr>
<td>Bambusa bambos</td>
<td>13%</td>
</tr>
<tr>
<td>D. hamiltonii</td>
<td>7%</td>
</tr>
<tr>
<td>B. tulda</td>
<td>5%</td>
</tr>
<tr>
<td>B. pallida</td>
<td>4%</td>
</tr>
</tbody>
</table>
Bamboo area in different parts of India

North East Region: 40%
Madhya Pradesh: 9%
Maharashtra: 8%
Chhattisgarh: 8%
Orissa: 8%
Karnataka: 6%
Andhra Pradesh: 6%
Rest of India: 15%
MAIN TECHNICAL CHARACTERISTICS

• Fast Growing & Matures in Four Years

• Culms are generally long & straight

• Hollow internodes make it comparatively light: gives it a high strength-weight ratio.

• Tensile strength is high parallel to the grain
MAIN TECHNICAL CHARACTERISTICS (2)

- Weak transverse bonds between fibres, thus can be split easily along the length
- Easily cut in required size with less energy intensive tools
- Ease to season and chemically treat to improve dimensional stability and durability
Primary Processing - PRESERVATIVE TREATMENT

Boucherie Process

Inter nodal Injection Method

Hot & Cold

Dip Diffusion
Preliminary Processing

Cross- Cutting m/c

Splitting m/c

Knot Removing, Width sizing & Planing m/c

Slab Making m/c
Primary Processing (Video)
Research Efforts in IPIRTI since mid Seventies brought out the following innovations:

• Bamboo Mat Based Products (Gen 1)
• Bamboo Strip Based Products (Gen 2)
• Bamboo lumber based Products (Gen 3)
• Advance bamboo based Products (Gen 4)
• Bamboo Housing
Bamboo mat based products (1G)

BMB
BMVC
BMC
BMMSD
BMCS
BMRC
Bamboo Mat Tray
Innovative applications & uses of BMB

BMB technology was commercialised in the 1985 in Angamally, Kerala and in 2002 in Bynihart Meghalaya
Bamboo Industrialisation (Video)
Milestones in Bamboo Industrialisation

1985: BMB Factory at Angamally, Kerala

2002: BMCS Production at Byrnihat, Meghalaya

2011: Bamboo Laminates from Nallalam, Kerala

2014: Bamboo Scrimber from Agartala, Tripura
Bamboo Board Factory Angamally, Kerala

• Established in 1985, to produce BMB using Bamboo mats

• Commercial production in 1990 and by 1998 Production doubled by second shift

• Daily Production 21,500 sq ft (1998 Sq.mt)
Bamboo Board Factory Angamally, Kerala

Better employment opportunities for the traditional bamboo workers who are economically backward
Bamboo Board Factory Angmally, Kerala

Now 21,500 sq ft (1998 Sq.mt) of Bambooply on 4 mm basis is produced daily on an average
Timpack Pvt Ltd Byrnihat, Meghalaya

Started production in 2002 with technology transfer from IPIRTI
We had basically timber based business here in Meghalaya
Bamboo strip based products (2G)

Horizontal Laminate

Vertical Laminate

Bamboo Floor tiles
Innovative uses of Bamboo strip based products
Innovative Applications of Bamboo Laminates

Commercial production of bamboo strip based products started in 2011 in Kozhikode, Kerala.
KSBC-Hi-tech Bamboo Flooring Tile Factory: Nallalam

- Commissioned in 2011 at Nallalam, Kozhikod
- Close proximity to Bamboo Forests such as Nilambur, Wayanad etc.
- Tiles size of 0.96mt x 0.096 mt and thickness of 15mm and 18 mm.
- Installed capacity is 1, 44,000 sq mt of Bamboo Flooring per annum.
- Price Rs. 150/- and Rs. 200/-per Sq. Ft depending on the quality of the product.
BAMBOO FLOORING TILE FACTORY : NALLALAM (Video)
Bamboo lumber based products (3G)

Commercial production of bamboo lumber started in 2014 in Agartala, Tripura.
M/S Mutha Industries (Video)
Mutha Industries Pvt Ltd

Started production of bamboo wood (Epitome) in 2014 in Agartala
Innovative uses of Bamboo lumber products
VALUE CHAIN NETWORK (video)
Couple of industries i.e. M/s Century Ply Ltd and M/s Artisan Agrotech Ltd are in the process for establishing commercial units of bamboo based MDF/Particleboard in Assam and MP respectively.
BAMBOO HOUSING

Prefab Bamboo House, Hyderabad

Prefab Bamboo Solar Hut, Delhi

IPIRTI-TRADA Housing Technology

IPIRTI-TRADA Two bedroom Guest House
Bamboo Housing (Video)
## Cost comparison

### Bamboo viz-a-viz Non-bamboo

<table>
<thead>
<tr>
<th>Bamboo Products</th>
<th>Cost per sq ft(Rs.)</th>
<th>Non-bamboo Products</th>
<th>Cost per sq ft(Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMCS-4mm</td>
<td>208</td>
<td>Asbestos-8mm</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GI Sheet-0.7-1.2mm</td>
<td>30-40</td>
</tr>
<tr>
<td>BMB 6mm</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*BMB 9mm</td>
<td>85</td>
<td>*Plywood/BWP/12mm</td>
<td>90-130</td>
</tr>
<tr>
<td>Flooring tiles (laminates)</td>
<td>256-312</td>
<td>Hardwood flooring tiles</td>
<td>325-750</td>
</tr>
<tr>
<td>Flooring tiles(BSL)</td>
<td>350</td>
<td>Ceramic tiles(10-12mm)</td>
<td>32-350</td>
</tr>
<tr>
<td>IPIRTI-TRADA Housing</td>
<td>1150-1250</td>
<td>Conventional RCC house</td>
<td>1400-1450</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With CC flooring</td>
<td></td>
</tr>
<tr>
<td>Pre-Fab Housing</td>
<td>1700-1900</td>
<td></td>
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</table>

Above cost are approximate market price

*Mechanical performance of 9 mm BMB is equivalent to 12 mm plywood
Major future identified areas

- Bamboo Oriented Strand Board (OSB)
- Bamboo Sleek Board
- Bamboo Plastic Composites
High ends products out of Bamboo are eco-friendly, cost-effective, easy to adopt, durable, high-in-finish

Demand for bamboo based products is poised to rise with the growing concept of green building material.

With decreasing supply of traditional wood there is increasing interest to accept bamboo as a substitute.
CONCLUSION

- High End Bamboo based composites provide promising linkages between organized sector (e.g. resin bonded boards) and unorganized sector (e.g. hand woven mats).

- Significant potential to uplift the economy by generating awareness, skill up-gradation, technology transfer, training and market development.
CONCLUSION (Video)
Thank you....

Further information

www.ipirti.gov.in