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Applications

INFO-SHEET

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Maturity Marking of Bamboo Culms

Bamboo culms vary in their strength and other properties with age.

It is therefore important to know the age of the culm to enable harvesting at the right time, and to ensure that the appropriate requirement of strength is met for its further use in products and applications.

This can be done through a simple Maturity Marking System (MMS), such as the one described in this info-sheet.

Bamboo Culms

- Bamboo culms are the stems of the bamboo plant. They are the most visible and most commonly used part of the plant. The culm is normally a hollow cylinder segmented by solid nodes and tapering towards the top.

- The culm emerges as a young shoot from the ground, and rapidly turns woody and elongates, reaching its full height within just 3 to 4 months. After this, the physical dimensions of the culm do not change; it does not grow taller or wider.

Bamboo Clumps

- Throughout the country, with only a few exceptions, bamboo is sympodial – that is, it grows in clumps. Bamboo culms within a clump may be closely spaced, as for example in *Bambusa bambos*, or loosely spread out, as in *Bambusa vulgaris*.

- Each clump consists of a large number of culms of varying ages. There may be culms that are a year old, as well as culms that are two or three years old, or even older.

Strength and Other Properties of Culms

- Culms below one year of age have very high moisture content and shrivel up after harvesting.
- Young bamboo culms have a high starch content that makes them vulnerable to borers and termites when harvested and used. The process of lignification is also incomplete in young culms, leading to poor strength and mechanical properties.
- As the culm ages, the starch content reduces and the lignin content is enhanced, which contributes to the hardness of the culm.
- Culms therefore increase in strength and other properties as they grow older.
- A bamboo culm is strongest in its fourth and fifth years.
- After this it becomes progressively brittle and weak, until it dies in its seventh or eight year.

Uses of Culms of Different Maturities

- For pulping, 2–3-year-old bamboo is preferred; bamboo over 5 years old is not desirable.
- For woven applications, in craft and for mat-making, where mechanical strength requirements are less, 2–3-year-old culms may be used. At this age, they are flexible enough to be easily woven.
- For board-making and for structural applications, only 4-year-old bamboo should be used.

Identifying Culm Maturity

- Under field conditions, it is not easy to distinguish the age of a bamboo culm, especially since culms in a mature clump tend to have the same girth, length and nodal structure.
- People familiar with bamboo cultivation can sometimes distinguish bamboo of different ages in a clump. The accuracy of such distinction is, however, dependent on the skill and experience of the person, and is not always reliable.
- There is therefore a need, especially in organised plantations, to implement objective systems of maturity identification, based on distinguishing marks placed on the bamboo culms. These systems provide an objective basis for harvesting decisions, and help to ensure out-turn of good-quality and mature bamboo.

Maturity marking systems are used and encouraged in several parts of the

world as part of the package of practices for cultivation of bamboo. Such systems ensure that bamboo of the desired maturity is harvested.

In some countries, the year of culm emergence is engraved or written on the bamboo culm. This is an inexpensive and easy method. Engraving may, however, damage the culm wall. Also, in both cases, the numerals tend to fade over time and become indistinguishable.

Another system uses multiple colour bands, with one band added every year. Thus, a 2-year-old bamboo will have 2 bands, and a 4-year-old bamboo will have 4 bands. This is a laborious process, however, because every bamboo in the clump and in the plantation has to be marked every year. It is particularly cumbersome in the case of bamboo culms in the middle of a clump, which are difficult to access. Also, the colour bands, since they are of the same colour, tend to merge into each other.

The simplest and most effective system, described below, is a single colour band marking system.

Single Colour Band Maturity Marking System

(Developed by K.S. Sethi, Forest Department, Government of Tripura, 2003)

- The essential feature of this system is placement of a coloured band painted on the culm in the year in which it emerges.

- Five colours are used, one for each year of a 5-year cycle. Culms that are 6 years old should not be retained in the clump, as they become weak and brittle and can be expected to die within a year or so.

- The colours, and the years in which they are to be used are as follows:

Red	2005	2010	2015
Yellow	2006	2011	2016
Blue	2007	2012	2017
White	2008	2013	2018
Black	2009	2014	2019

- Marking is to be done after the culm attains its full height, that is, after it has stopped growing. The indication of the stoppage of further dimensional growth (length) is when branches begin to appear, normally first in the upper portion of the culm.

- The culm sheath should be detached from the culm before beginning to paint.

- The colour band should be 3 inches (7–8 centimetres) thick, and placed at breast height, in the inter-nodal portion of the culm.

- The colour bands should be placed cleanly; care should be taken not to let the paint drip down the culm.

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