

Research Paper :

**Performance evaluation of external knot removing machine of bamboo**

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**ABSTRACT**

The Konkan region of Maharashtra state contributes 70,000 tones of bamboo production that is about 28 per cent of total production of Maharashtra. The various varieties of bamboo are used for agriculture implements, fishing industry, basket making, horticulture and handicrafts etc. The cost of operation, energy requirement, sound level and capacity of bamboo external knot removing machine was studied for the bamboo variety *Dendrocalamus strictus* (Manvel). The fresh fully matured dull green bamboo contains the 40.96 per cent moisture. The dry yellowish bamboo contains 8.62 per cent moisture. At no load condition, the maximum and minimum sound level from the machine was 95 dB (A) and 77.1 dB (A), respectively. The maximum and minimum sound levels for freshly cut bamboo were 101 dB (A) and 83.65 dB (A), respectively. In case of dry bamboo maximum and minimum sound levels were 106.3 dB (A) and 89.9 dB (A), respectively. The sound level was more for dry bamboo as compare to fresh bamboo. The power required by machine at no load condition was 2.2 kW. At load condition for freshly bamboo energy consumed was 1.03 kWh whereas for dry bamboo energy consumption was 0.81 kWh. The capacity for freshly bamboo was found to be 188 knots per hour whereas the capacity of machine for dry bamboo was found to be 201 knots per hour.

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**Key words :** Bamboo external knot removing machine, Sound level, Moisture content, Energy consumption

The graceful gigantic grasses popularly and collectively known as bamboo are widely used for different purpose like craftwork, structural purpose, agricultural equipment, paper industries etc. Bamboo grows most abundantly in the orient where it is native to China, Burma, India, Japan, Europe and Canada. India has annual bamboo production as 4.5 million tones. In Maharashtra bamboo production is 2,47,239 tones. The Konkan region contributes 70,000 tones of bamboo production. Some of the prominent uses of bamboo are in house construction as structural material, agriculture implements, fishing industry, basket making, horticulture and handicrafts etc. besides extensive use in pulp and paper industry. Negi (2000) reported that in India 32 per cent, 30 per cent, 17 per cent, 71 per cent and 14 per cent of total bamboo produced is used for rural housing, agriculture implements, pulp, box making and other purpose, respectively.

Liese (1995) observed that immature bamboo of *Dendrocalamus strictus* lost its moisture content faster than mature bamboo of same species, but it took longer to dry completely due to it's higher initial moisture content. The strength of bamboo is higher in dry condition than in green condition. BIS (IS code 12207) (1987) stated that the maximum ambient noise emitted by the tractor and maximum noise of operator's ear level should not exceed 90dB(A) for 8 hr. duration. It is generally concluded that 40 hr. of exposure per week of noise of 90 dB or greater

will result in hearing loss.

The removal of external knot is very crucial for further operation of bamboo. As the knots have very hard structure, manually removal of knot requires more time and labour. Removal on bamboo external knot removing machine creates high sound level. Thus a study was undertaken to determine the sound level of bamboo external knot removing machine during operation. Bining (1985) studied on energy requirement in operation of cutting wooden material and found that total power required at load was 2.2 kW to 3.7 kW and energy required for cutting under optimum condition and 0.9 to 1.2 kW. The Table 1 shows the permissible noise exposures to human being.

**Table 1 : Permissible noise exposures**

| Sr. No. | Duration per day (hours) | Sound level (dBA) |
|---------|--------------------------|-------------------|
| 1.      | 8.0                      | 90                |
| 2.      | 6.0                      | 92                |
| 3.      | 4.0                      | 95                |
| 4.      | 3.0                      | 97                |
| 5.      | 2.0                      | 100               |
| 6.      | 1.5                      | 102               |
| 7.      | 1.0                      | 105               |
| 8.      | 0.5                      | 110               |
| 9.      | 0.25 or less             | 115               |