仓储湿度对毛竹材性能的视觉评价

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摘 要：毛竹（*Phyllostachys pubescens*）资源被认为李是经济建设和生态建材最重要的战略资源之一。仓储湿度是导致毛竹发霉变质的客观因素之一。【目的】明确研究环境湿度对竹材使用价值的影响。【方法】分别在湿度为 45%、60%、75%和 95%的模拟环境下测试了竹材仓储期间（1、7、14、28、56、180d）的品质变化，并定期监测竹材在仓储过程中的质量变化。【结果】在 180 天的储存期间，随着仓储环境湿度的增加，竹青侧的尺寸膨胀率大于竹黄侧的尺寸膨胀率，竹材的腔径比逐渐减小。总色差值和质量密度损失率逐渐减小。位移载荷峰值应力逐渐增大。95%的相对湿度有利于霉菌的繁殖，但只对表面有影响。傅立叶变换红外光谱分析结果表明，贮藏过程中的质量变化更多的是与材料本身的半纤维素官能团信号峰的降低有关，同时伴随着各种单糖的降解，木质素官能团对应着 L*和总色差的降低，而热解耐受程度则与材料本身的半纤维素官能团信号峰的降低有关。热解耐受程度纤维素信号强度成反比。冗余分析表明，仓储环境湿度对竹材物理性状的贡献率依次为竹青线性尺寸>宽度尺寸>竹黄线性尺寸>含水率> 失重率>长度尺寸>a*，仓储时间与 L*值和压缩强度密切相关。【结论】综上所述，60%RH-75%RH 相对湿度仓储条件较好的保持原态工程材的固有属性，45%RH 仓储条件作为生物能源储备的优选条件，而 95%RH 仓储条件应及时避免。

关键词：毛竹；仓储湿度；总色差值；压缩性能；半纤维素官能团

Visual evaluation of warehousing humidity and time on bamboo performance

The inventories of Moso bamboo *(Phyllostachys pubescens*) resources are considered to be one of the most important strategic resources for economic construction and ecological building materials. Warehousing humidity is one of the objective factors that induce mold deterioration and quality deterioration of bamboo.【Objective】Clarifying the effect of environment humidity on the use value of bamboo.【Method】Humidity levels of 45 %, 60 %, 75 % and 95 % and indoor environments were artificially simulated and regularly monitored for changes in quality during warehousing.【Result】During the 180day storage period, with the increase of humidity in the warehousing environment, the dimensional expansion rate of the cortex side of bamboo was larger than that of the pith side and the cavity diameter ratio gradually decreased, Total color difference value, and mass density loss rate gradually decreased, and the peak compressive stress-strain displacement gradually increased, respectively. 95% RH is beneficial to mold reproduction and only infect the surface, Fourier Transform Infrared Spectroscopy analysis showed that the quality changes during storage were more related to the decrease in the signal peak of the hemicellulose functional group of the material itself accompanied by the degradation of various monosaccharides, the lignin functional group corresponded to the decrease in L* and Total color difference, and the degree of pyrolysis tolerance was inversely proportional to the signal intensity of the cellulose functional group. Redundancy analysis showed that the positive contribution of humidity in the storage environment to the physical quality of bamboo was Bamboo pith linear > Width dimension > Bamboo cortex linear > Water content > Weight loss rate > Length

Dimension > a*, and the storage time was closely related to the L* value and compression strength. 【Conclusion】 In summary, 60–75 % RH storage conditions were better maintained the quality of engineered bamboo. Moreover, 45 % RH storage conditions were preferred for maximizing bioenergy reserves, while 95 % RH storage conditions should be avoided. From the above methodology of study, a deeper understanding of bamboo and its sustainable aspects can be found.

Key words: Moso bamboo; Warehousing humidity; Total color difference; Compressive; Hemicellulose functional group