甘蔗茎在弯曲荷载下的破坏

Bending load induced failure forms of sugarcane stalks

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中文摘要：

研究甘蔗的物理力学特性对研究甘蔗切割过程、设计刀片具有重要意义。该文采用三点弯曲方法研究甘蔗茎在弯曲荷载下的力学特性。以“桂林—1号”甘蔗为试验材料，在日本SHIMADZU公司生产的AG-I 50 AUTOGRAPH材料力学试验机上进行了蔗茎的弯曲试验。试验结果表明：蔗茎在弯曲荷载下主要有4种破坏形式：中性层裂纹、横向裂纹、底部纵向裂纹、不规则裂纹。其中基部和尾部试样以横向裂纹为主，其他部位的试样产生中性层裂纹；“桂林-1号”甘蔗基部弹性模量的平均值为1172 N/mm^2，最大抗弯强度的平均值为46.5 N/mm^2；基部去掉蔗皮后，弹性模量的平均值为1514.8 N/mm^2，最大抗弯强度的平均值为42 N/mm^2；蔗茎基部的弹性模量在剥皮前后有显著差异，且基部蔗芯的弹性模量明显高于未剥蔗皮基部的弹性模量。蔗茎基部的抗弯强度在剥皮前后无显著差异。

英文摘要：

It is important to study the mechanical properties of sugarcane stalks for understanding the process of cutting sugarcane and designing blades. "Three point bending experiments" were conducted to study the mechanical properties of sugarcane under bending load. The experiments were conducted for the variety "Gulin-1", using the equipment of "AG-I 50 AUTOGRAPH", made by the CO. of SHIMADZU. The results are as follows: 1)Under bending load, sugarcane stalks have four failure forms: breaking at neutral layer, transverse breaking, breaking at axial direction under bottom, and irregular breaking. Samples from base or tail of sugarcane stalk mainly present transverse breaking, others present breaking at neutral layer. 2)For the variety "Gulin-1", the averages of Yong's modulus and bending strength of sugarcane stalks at base position are 1172 N/mm^2 and 46.5 N/mm^2, respectively. After peeled, they are 1514.8 N/mm^2 and 42 N/mm^2, respectively. 3) The Yong's modulus of sugarcane stalks at base position has distinct difference when the stalk is peeled, and it is larger than the values without peeling. The bending strength of sugarcane stalks at base position does not have distinct difference between the peeled stalk and one without peeling.

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