

库尔勒香梨不同膨压水平下的动态粘弹性 Turgor Effects on Dynamic Viscoelasticity of Korla Pear Tissue

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摘要: 对经过不同浓度蔗糖溶液渗透处理后具有高、低和正常3种膨压水平的库尔勒香梨果肉进行振荡剪切试验和蠕变试验,以考察膨压水平对香梨果肉组织粘弹特性的影响。结果表明,不同膨压香梨果肉在各频域内的储能模量( $G'$ )均远大于损耗模量( $G''$ ),且变化都不受频率影响,但均随膨压提高呈增大趋势。同时,不同膨压香梨果肉的蠕变响应可采用六元件广义 Kelvin-Voigt 模型精确拟合,模型中的瞬时弹性柔量( $J_0$ )、延迟弹性柔量( $J_1$ 和 $J_2$ )和稳态粘性柔量( $1/\eta_0$ )均随着膨压下降而增大。果肉组织扫描电镜观察表明,各粘弹参数( $G''$ 、 $G'$ 、 $J_0$ 、 $J_1$ 、 $J_2$ 、 $1/\eta_0$ )的显著变化与膨压调控引起的细胞结构和胞间隙变化有直接关系。Viscoelastic properties of Korla pear (*Pyrus bretschneideri* rehd.) tissue osmotically treated in iso-, hypo- or hypertonic sucrose solutions were investigated using oscillatory shear and creep-recovery tests. Results indicate that storage moduli ( $G'$ ) is much higher than loss moduli ( $G''$ ) over the entire frequency range. Both  $G'$  and  $G''$  show frequent independent, but increase with the increasing of turgor. In creep testing, the creep compliance responses of low, normal and high turgor tissues were characterized by a generalized Kelvin-Voigt model with six elements. The instantaneous ( $J_0$ ), retarded compliance ( $J_1$  and  $J_2$ ) and steady state fluidity ( $1/\eta_0$ ) increased as turgor was reduced. By scanning electron microscopy (SEM), many rheological parameters ( $G''$ ,  $G'$ ,  $J_0$ ,  $J_1$ ,  $J_2$  and  $1/\eta_0$ ) show the marked changes among the three turgor levels, which relates with the changes of cells and intercellular spaces due to the turgor manipulation.

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