

Title A mathematical model for predicting grape berry drop during storage
Author Yun Deng, Ying Wu, Yunfei Li, Peng Zhang, Mingduo Yang, Changbo Shi, Changjiang Zheng and Shanming Yu
Citation Journal of Food Engineering, Volume 78, Issue 2, January 2007, Pages 500-511
Keywords Grape; Abscission zone; Fruit detachment force; Berry drop; Storage

Abstract

Berry drop of grapes is a ubiquitous phenomenon during storage. A mathematical model based on biochemical changes in abscission zones was developed with aims of finding the relationship between the detachment force and abscission zone tissue change, and predicting the grape berry drop. The changes of hexose, middle lamella and cellulose as well as trans-membrane transfer of water were taken into account in the model. The parameters in the model were estimated by non-linear parameter fitting of experimental data. The proposed model was then validated under normal air and 4% O₂ + 9% CO₂ at 0 °C and 95% relative humidity for 60 days of storage. The mean relative percentage errors of the resulting model were 4.291% for air storage and 2.241% for controlled atmosphere (much less than 10%), the determination coefficients were 0.9592 and 0.9649, which indicated there was a good agreement between the simulating and experimental results, and the model was practical.