

Title Enzyme Kinetics Based Modelling of Respiration Rate for Apple
Author P. V. Mahajan and T. K. Goswami
Citation Journal of Agricultural Engineering Research, Volume 79, Issue 4, August 2001, Pages 399-406
Keywords apple; respiration rate; enzyme kinetic

Abstract

A respiration rate model, based on enzyme kinetics and the Arrhenius equation, was proposed for predicting respiration rates of fresh apple as a function of O₂ and CO₂ concentration and storage temperature. Several experiments were conducted at different storage temperatures for generating respiration data by using a closed system method of respiration measurement. In this model, the dependence of respiration rate on O₂ and CO₂ was found to follow the uncompetitive inhibition. The enzyme kinetic model parameters, calculated from the respiration rate at different O₂ and CO₂ concentrations, were used to fit the Arrhenius equation against different storage temperatures. The activation energy and respiration pre-exponential factor could be used to predict the model parameters of enzyme kinetics at any storage temperature between 0 and 30°C. Respiration rates of apple predicted by the proposed model were found in good agreement with those obtained experimentally.