Title Respiration modeling of cherry tomato (cv. Coco) at different temperatures for modified atmosphere packaging application

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Citation Philippine Agricultural Scientist, 90(4) p. 272-282, 2007.

Keywords Cherry tomatoes; Varieties; Oxygen; Carbon dioxide; Polyethylene; Sacks; Packaging; Temperature; Respiration

Abstract

Oxygen depletion and CO2 accumulation in a closed respiration system containing fresh cherry tomato (cv. Coco) at the light-red stage ripeness was monitored. Experiments were carried out at 10, 12.5, 17 and 20 deg C. Five models based on enzyme kinetics equations were evaluated using the data generated, uncompetitive inhibition model was selected for further validation based on goodness of fit to experimental data. Effect of temperature on model parameter Vsubm followed Arrhenius kinetics for both O2 consumption and CO2 production rates (R sup2 of 0.999 and 0.974, respectively). Computer simulations showed that 0.30-0.45 kg of cherry tomato (cv. Coco) could be packed in 20 cm x 20 cm 30-micro m polyethylene (PE) bags and held at 10-20 deg C without producing anaerobic O2 levels, for 40-micro m PE, predicted headspace O2 concentration was below the recommended minimum of 3 percent at this temperature range. The model predicted gas levels accurately in respiration chambers containing a batch of measured gas levels showed rsup2 of 0.992 for both O2 and CO2. The model was less accurate in predicting O2 levels in actual 30 micro m PE packs, r sup 2 of predicted and measured gas levels were 0.975 and 0.939 for O2 and CO2, respectively. Packaging trials proved that 30 micro m PE could maintain an acceptable quality of fruits for 5 d at 20 deg C if fruits were defect-free. Optimum fill weight for a 20 cm x 20 cm pack was 0.45 kg.