Title Modelling the temperature dependence of respiration rate for sweet cherries

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Abstract

This paper discusses the relationships between storage environment, respiration rate and storage life using sweet cherries as a case study. Cherries are a highly perishable crop and good temperature control is vital to maximise retention of quality and ensure adequate storage life. Hydrocooling to rapidly remove field heat is recommended and the optimal storage temperature is 0°C. Slow or delayed cooling and temperature abuse during transport or marketing will all accelerate deterioration, increasing the risk of losses through poor product appearance or rots. Modified or controlled atmosphere storage can also be employed to advantage in prolonging cherry storage life. To design and analyse MAP systems, it is necessary to quantify The dependence of respiration rate on temperature and gas composition. These relationships may also have utility in characterising changes in fruit quality due to temperature variation in the cool chain. Using data drawn from the literature on sweet cherry physiology and storage, the dependence of cherry respiration rate on temperature for normal air storage is shown to be adequately described by a generic Arrhenius relationship with an activation energy of ~63 $kJ.mol^{-1}$. However, different cultivars exhibit significant differences in their physiological responses and opportunities for further development of the model to incorporate cultivar-specific temperature and gas atmosphere responses are demonstrated. The application of the derived models is illustrated through typical supply chain data to highlight the importance of the cold chain in maintaining cherry fruit quality.