

Title Modelling the respiration rates of pomegranate fruit and arils
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Abstract

The design of modified atmosphere packaging (MAP) for fresh and fresh-cut fruit requires adequate prediction of respiration rates (RRs). A study was conducted to determine the influences of storage temperature (5, 10 and 15 °C) and duration on RR of whole pomegranate fruit and arils of two pomegranate cultivars ('Acco' and 'Herskawitz'). The RR of whole fruit was two to three folds higher, in comparison to those of the fresh arils across all storage temperatures. Temperature had a significant influence on RR. Over the range of storage temperatures studied, RO_2 and RCO_2 increased from 4.53 to 14.67 mL/kg h and 5.67 to 18.53 mL/kg h, respectively, for whole fruit, while RO_2 and RCO_2 of fresh arils ranged from 2.51 to 7.59 mL/kg h and 2.72 to 9.01 mL/kg h, respectively. The cultivar 'Acco' had higher respiration rates (mL/kg h CO_2 production) than 'Herskawitz', especially as the length of storage increased at higher temperature conditions. The respiration quotient (RQ) for the whole fruit of both cultivars ranged from 1.14 to 1.26, while that of fresh arils ranged between 1.06 and 1.62. Experimental evidence showed that the significant influence of higher temperature in increasing the RQ of pomegranate arils was more pronounced towards the end of the storage period. The effects of temperature on rates of O_2 consumption and CO_2 production of whole fruit and arils were adequately described by an Arrhenius type model. The model was validated for whole fruit stored at 8 °C, and a good agreement was found between experimental and predicted data.