

Title Use of a bespoke temperature block to study the detailed effect of postharvest storage temperature on blackcurrant berries

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Abstract

Blackcurrants (*Ribes nigrum* L.) are not only distributed as frozen and thermally processed products but are increasingly available as fresh berries. After harvest, fruit quality of blackcurrants declines dramatically, making postharvest storage at low temperatures a requirement. Given this situation, and since the popularity of blackcurrants is increasing due to their high content in certain bioactive compounds, further research is required to reveal the effect of storage temperature on both the quality and nutritional value of fresh berries. Accordingly, the aim of the present study was to elucidate the detailed effect of storage temperature over a one week period, using a bespoke temperature block system (1- 20°C inclusive in 1°C intervals), on taste (viz. sugars and organic acids) and health-related (viz. ascorbic acid (AsA) and individual anthocyanins) compounds in fresh blackcurrant berries harvested at two maturity stages; early ripe (ER) and fully ripe (FR). For most of the target analytes studied, temporal changes observed during postharvest storage mimicked those observed during berry ripening. Specifically, monosaccharides (fructose and glucose) in FR berries reached maximum concentrations after three days of storage (1.12 and 1.11-fold higher respectively than at day zero) independent of temperature, but were not affected by either time or temperature when assessed in ER berries. In contrast, sucrose content was as much as 1.6-fold greater in ER as compared to FR blackcurrants, and tended to decline during storage time and with increasing temperatures. Citric acid accounted for ca. 82.4±6.7% of the total organic acid content and was the only analyte not affected by the imposed conditions of this study. AsA and malic acid were greater in ER berries than in FR and in both cases declined during postharvest storage. Finally, anthocyanin content was double in FR than in ER fruits and generally increased during postharvest storage. Temperature did not significantly affect anthocyanin content, except for delphinidin-3-glucoside which was relatively low in berries stored between 4 and 10°C. The results from this study may provide suitable information for optimising storage conditions of fresh blackcurrant berries and hence improving the maintenance of certain blackcurrant bioactives.