Fruit quality and major primary metabolites differ across production systems in cold-stored figs (*Ficus carica* L.)

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Abstract

The greenhouse production system is becoming popular in fig cultivation as a means to extend the harvest window and season of fig fruit. The aim of this study was to evaluate the comparative effects of two production systems (open field *vs.* greenhouse) on the physiological and biochemical responses in terms of fruit quality attributes and the major primary metabolites in 'Masui Dauphine' fig fruit stored at 0.5 °C for up to 30 days. Weight loss increased with storage duration and was much greater for fruits grown in the greenhouse than those grown in the open field; fruit length and diameter at the peduncle-end region decreased with storage duration and were much shorter in the greenhouse fruit than in the open field fruit; fruit respiration rate was higher in the open field fruit than in the greenhouse fruit during cold storage. The colour variables gradually decreased in peel tissues regardless of the tissue region but were not consistent in the cortex tissues during cold storage; and the glucose and fructose levels increased with storage duration, regardless of the production system. The organic acid contents were not consistent during cold storage—citric acid content was higher but fumaric acid content was lower in the open field fruit than in the greenhouse fruit. Aspartic acid, arginine, γ-aminobutyric acid, methionine, tryptophan, phenylalanine, leucine, and lysine levels were higher in the open field fruits than in greenhouse fruits, and vice-versa for glutamic acid. The results of multivariate data analyses, including a normalised heatmap matrix system, principal component analysis loading plot, and correlation coefficient matrix, indicated that fruit quality attributes and major metabolites responded differentially to production systems during cold storage. Overall, the results suggested that production systems could affect fig fruit quality and storability as well as the concentrations of certain major metabolites during cold storage.