

Contrasting responses to carbohydrate limitation in mandarin fruit during growth

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The selective removal of leaves around mandarin fruits can improve the quality of ripening fruits by influencing parameters such as sugar and organic acids content. The outcome depends strongly on the timing of defoliation, which influences the source-sink balance and the modified microclimate surrounding the fruits. We induced carbohydrate depletion by removing source leaves at two key periods in mandarin development (early and full citric acid accumulation). We assessed the resulting changes in the short term (within 48 hours) and long term (several weeks until ripening).

Control mature fruits were characterized by elevated fresh weight, large diameters, and high quantities of malic acid, citric acid and sucrose. At the same stage, fruits subjected to early or late defoliation had higher glucose, fructose, citric acid concentrations and lower sucrose concentrations. They differed only in their malic acid concentrations, which were higher in early defoliation fruits and similar in late defoliation fruits when compared to control fruits. Finally, fruits subjected to late defoliation were characterized by high proline and GABA concentrations, and low fructose and glucose concentrations. We have shown that short- and long-term carbohydrate limitation modifies sugar and organic acid metabolism during mandarin fruit growth.

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