

Title Fruit quality and postharvest performance of Cripps pink apple in relation to withholding irrigation

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Abstract

Poor fruit colour development and water use efficiency in 'Cripp's Pink' apple are major constraints for Australian apple growers to boost profits. This study aimed to investigate the effects of withholding irrigation (WHI) at various apple fruit development stages on improving fruit quality at harvest particularly fruit colour without adversely affecting storage life and quality of cold-stored fruit. WHI was implemented at different periods in apple fruit development stage (phase II and III) from 135, 145 and 155 days after full bloom (DAFB). The periods of WHI are related to the baseline value of stem water potential for water stress tree (>-2.5 MPa). Treatments were (i) T1, fully irrigation as control (from 135 to 200 DAFB), (ii) T2, from 135 to 153 DAFB, (iii) T3, from 145 to 175 DAFB, and (iv) T4, from 155 to 200 DAFB. WHI applied in T3 significantly reduced stem water potential, soil volumetric water content and stomatal conductance, 10 days after the commencement of WHI. Diameter still met the consumer acceptance for export criteria (>65 mm). Fruit drop was not affected with the WHI treatments. Irrigation withheld for 30 days (T3) enhanced red skin colour, soluble solids concentration (SSC) firmness and total anthocyanins concentration at harvest as compared to control. WHI fruit from T3 were further stored at 0 ± 0.1 °C ($90\pm 2\%$ RH) for 70 and 140 days and retained higher firmness (>68 Newton) and SSC ($>15^\circ$ Brix) as compared to other treatments. But, titratable acidity in all treatments decreased as the storage periods prolonged. WHI fruit from T3 stored for 140 days increased ascorbic acid content and total antioxidants in the flesh as compared other treatments. In conclusion, WHI applied in the middle of stage II, from 145 to 175 DAFB (T3) improved fruit colour development and other major fruit quality attributes at harvest without adversely affecting postharvest quality in cold storage and also reduce water use.