

**Title** Impact of regulated deficit irrigation on quality and postharvest storage performance of cripps pink apple

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### Abstract

Poor fruit colour development in 'Cripp's Pink' apple [*Malus sylvestris* (L.) Mill var. domestica (Borkh.) Mansf.] causes tremendous economic losses to the apple growers. Moreover, the occurrence of droughts and limited availability of water are major threats to the sustainability of Australian apple industry. This study aimed to develop an irrigation strategy for apples to improve fruit skin colour without adversely affecting postharvest life and quality. Regulated deficit irrigation (RDI) at different levels {100% commercial irrigation ( $70 \text{ L}\cdot\text{h}^{-1}$ ) as control, 25% RDI ( $50 \text{ L}\cdot\text{h}^{-1}$ ), 50% RDI ( $35 \text{ L}\cdot\text{h}^{-1}$ ), and 75% RDI ( $20 \text{ L}\cdot\text{h}^{-1}$ )} was applied from 135 days after full bloom (DAFB) continuously imposed for 72 days till harvest. RDI (75%) significantly reduced stem water potential, soil volumetric water content and stomatal conductance as compared to control. RDI (75%) improved fruit skin colour through enhanced accumulation of anthocyanins, increased soluble solids concentration (SSC) and flesh firmness; but decreased the fruit diameter marginally which still meet the export criteria ( $>65 \text{ mm}$ ). The RDI fruit (75%) stored for 135 days in cold storage ( $0\pm 0.1 \text{ }^\circ\text{C}$ ,  $90 \pm 2\% \text{ RH}$ ) remained firmer and had higher SSC compared to control fruit. Similarly, RDI fruit (75%) stored for 155 days in controlled atmosphere ( $2.7\% \text{ O}_2 + 1.9\% \text{ CO}_2$ ) at  $0^\circ\text{C}$  had higher SSC and flesh firmness than in control fruit. In conclusion, RDI (75%) imposed at the late fruit development stage improved the fruit quality of 'Cripp's Pink' apple at harvest without adversely affecting postharvest quality in cold and CA storage, and also saved the irrigation water.