

**Title** Dynamic controlled atmosphere storage of New Zealand grown 'Hass' avocado fruit

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### Abstract

Refrigerated storage may not provide sufficient storage life for New Zealand-grown 'Hass' avocado fruit to reach some markets. Conventional (static) controlled atmosphere storage (SCA) prolongs storage life, but also prolongs the ripening time after storage and results in variability in ripeness within a tray and a higher expression of rots. Dynamics controlled atmosphere storage (DCA) prolongs the fruit storage life without prolonging the ripening period, resulting in a more rapid, uniform, ripening with fewer rot. In DCA, the lowest safe O<sub>2</sub> level is set by determining the low O<sub>2</sub> stress point by chlorophyll fluorescence, and then increasing the O<sub>2</sub> (termed 'backing off') to just above the stress point. The O<sub>2</sub> level is reset during storage to match the fruit tolerance to low O<sub>2</sub>.

To maximise benefits from DCA, several parameters of DCA operation need optimising, including the time after harvest at which the lowest safe O<sub>2</sub> level is first established (delay), the degree of back-off in O<sub>2</sub> above the low O<sub>2</sub> stress point (back-off), and the frequency of resetting the lowest safe O<sub>2</sub> level during storage (frequency). The DCA operating parameters were investigated by storing 'Hass' avocado fruit for 6 weeks at 5°C in DCA. Fruit were held in air for 48 or 96 h after harvest before the initial lowest safe O<sub>2</sub> level was established by backing-off by 0.2 or 0.8% O<sub>2</sub>. The lowest safe O<sub>2</sub> level was reset every 10 d (repeat) throughout storage, or left as that achieved at the start of DCA (once). To determine whether the fruit response to the DCA operating parameters changes through the harvest season, fruit were harvested in late October, mid December and mid February.

Fruit quality following DCA was optimised by setting the DCA O<sub>2</sub> level soon after harvest, backing-off to just above the low O<sub>2</sub> stress point, and repeatedly re-setting the O<sub>2</sub> level during storage. The main effect of frequency was on skin colour and fungal pitting (FP) at the end of storage, and on the time to ripen after storage. In contrast, the effects of back-off were on FP and diffuse flesh discoloration and delay on stem-end rot expression. There were no major differences in the response of fruit harvested at different times of the season to the DCA operating parameters. However, the lack of a marked difference in the days to ripen between the early and late harvested fruit is not typical, and therefore the lack of effect of harvest time on DCA operating parameters needs confirmation.