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DIFFERENCE IN FRUIT RIPENING AND QUALITY FROM TREES WITH DIFFERENT YIELD

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PROGRESS REPORT

INTRODUCTION

Postharvest quality after long term storage and transport to distant markets remains a perennial problem in the South African avocado industry (Bower & Cutting, 1988). Major physiological postharvest problems include early softening, mesocarp discolouration and vascular browning (Cutting *et al,* 1990). There appears to be seasonal differences and periods within a season when postharvest fruit quality declines (Leclereq, 1990). The potential for poor postharvest quality has increased over the last decade, and tree vigour has improved (primarily as a result of the successes in combating root rot). Fruit calcium is correlated with tree vigour (Whitney *et al,* 1990a) and is thought to play a major role in determining fruit quality (Bangerth, 1979; Whitney *et al,* 1990b). However, the effect of tree yield on fruit quality does not appear to have been investigated.

In this study we report upon the effect of, yield on the ripening physiology and postharvest quality of Fuerte avocado after 28 days' storage.

MATERIALS AND METHODS

Selected trees on Westfalia Estate in the Eastern Transvaal were catergorised according to yield. There were five yield categories namely: very poor, poor, average, above average, excellent. There were five trees and 40 fruits per category.

Fruits with an average mass of 300 g were harvested in late June, packaged, transported to the Cape and stored at 5,5°C for 28 days. After storage the fruits were placed at 21 °C and allowed to ripen. When ripe, the fruits were sectioned longitudinally and visually assessed for physiological quality. The mesocarp was then cubed, freeze-dried and stored at -20°C until analysed.

Measurements and records taken included time to ripeness, cold damage (more than 5% surface area of the fruit), mesocarp discolouration and vascular browning. Calcium, polyphenol oxidase activity and phenolics still need to be determined.

RESULTS AND DISCUSSION

Fruits from high yielding trees tend to ripen faster after storage than the fruits from poor yielding trees (Figure 1). This could be related to tree vigour and possible shortages of fruit calcium and this aspect will be investigated this coming season. Cold damage was highest in average to low yielding trees (Figure 2). Mesocarp discolouration was lowest in average to low yielding trees (Figure 3). This is in agreement with earlier findings (Cutting & Bower, unpublished results) and the general observation that mesocarp discolouration has increased with increasing yield. This could be related to fruit calcium, whereby fruits from high yielding trees would have less calcium than fruits from lower yielding trees. This information will be obtained this coming year. In an unpublished study by Cutting & Bower in 1987, polyphenol oxidase (the browning enzyme) has shown to be higher in fruit from vigorous orchards. There was no relationship between yield and vascular browning.

This study has only just begun and is in its infancy. The mineral composition, PPO activity and phenolic substrate still need to be determined. A second season's data would be useful in formulating conclusions. What has already emerged from this small study is that there is a trend in the differences in fruit quality from trees with different yields. This relationship must now be investigated statistically in a larger replicated and blocked trial. If these preliminary results are shown to be statistically positive, there will be obvious implications for both the cultural management and marketing of avocados from trees of different yield classes in a clonal orchard.

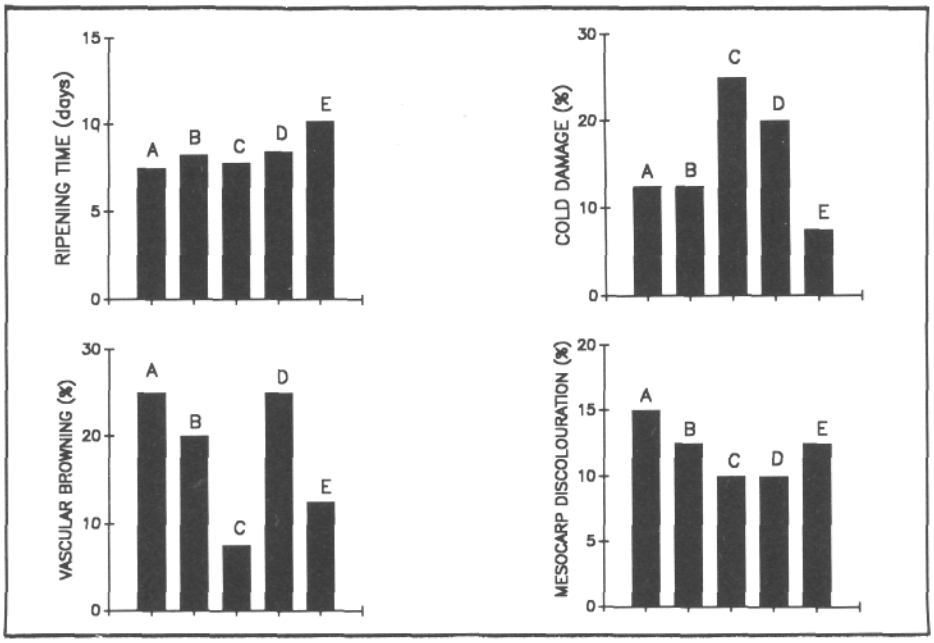

Fig 1 *The effect of tree yield (fruiting vigour) on Fuerte fruit ripening characteristics.* Yield class A = excellent, B = above average, C = average, D = poor and E = very poor. Results are the means of 40 fruits per yield class.

REFERENCES

BANGERTH, F, 1979. Calcium related physiological disorders of plants. *Ann Rev Phytopathol* 17, 97 - 122.

BOWER, J P AND CUTTING J G M, 1988. Avocado fruit development and ripening physiology *Hort Rev* 10, 229 - 272.

CUTTING, J G M, BOWER, J P, WOLSTENHOLME, B N and HOFMAN, P J 1990. Changes in ABA, polyphenol oxidase, phenolic compounds and polyamines and their relationship with mesocarp discolouration in ripening avocado *(Persea Americana* Mill) fruit. *J Hort Sci,* 65, 455 - 471.

LECLÉREQ, H, 1990. Observations on overseas markets during the 1989 avocado season. *S A Avocado Growers' Assoc Yrb* 13, 11 - 13.

WHITNEY, G W, HOFMAN, P J and WOLSTENHOLME, BN, 1990a. Effect of cultivar, three vigour and fruit position on calcium accumulation in avocado fruit. *Scientia Hort,* 44, 269 - 278.

WHITNEY, G W, HOFMAN, P J and WOLSTENHOLME, B N, 1990b. Mineral distribution in avocado trees with reference to calcium cycling and fruit quality. *Scientia Hort* 44, 279 - 291.