SOME PHYSIOLOGICAL ASPECTS OF DELAYED HARVEST OF 'HASS' AVOCADO *(Persea Americana* Mill.) IN THE NATAL MIDLANDS

CLIVE KAISER

Submitted in partial fulfilment of the requirements for the degree of MASTER OF SCIENCE IN AGRICULTURE in the Department of Horticultural Science, University of Natal, Pietermaritzburg

January, 1993

ABSTRACT

In cool, mesic, subtropical areas such as the high rainfall Natal midlands, harvesting of avocado fruit of late maturing cultivars such as 'Hass' may be delayed for several months beyond 'minimum legal maturity'. The financial incentive for such delayed harvest may however be offset by certain disadvantages. In particular, carrying a heavy crop into a second season may adversely affect fruit set, fruit growth and some aspects of the phenological growth cycle. The objective of this study was to quantify where possible the effects of delayed harvest on yield, fruit size, fruit lipid and fatty acid content and composition, and starch reserves in trunk bark. The study was conducted at two sites on the 'Hass' cultivar, with mid-monthly harvests from July (mid-winter) through November (early summer).

Annual average trunk starch concentrations although significantly higher (ca.4.75%) in July harvested trees were not depressed much in trees harvested from August through November (ca.4.1%), where there were no significant differences. Fruit flesh lipid levels plateaued at around 70% (dry mass basis) by mid-August and decreased to about 65% at one farm in October 1991 and September 1992. It is suggested that fruit in the cool, mesic, subtropical Natal midlands should not be harvested until lipids reach 70% on a dry mass basis. The beneficial, serum cholesterol-reducing monounsaturated fatty acids, viz. oleic and palmitoleic acids were the most abundant fatty acids (collectively up to 70%) in 'Hass' fruit used in this study. Yields of the subsequent crop were not depressed during the trial and fruit size increased with late harvest. For example, most fruit were found in count 18 (211 to 235 g) in July and count 14 (266 to 305 g) in November per 4 kg carton. The results suggest that under the experimental conditions of this study viz. good management and healthy, vigorous trees, late hanging of 'Hass' fruit in the cool, mesic Natal midlands may be practised without a significant depression of yields and tree vigour. However, a tree-year study in S.E. Queensland by Whiley *et al.* (1992) did show an average ± 15% yield reduction from late harvest of 'Fuerte' avocado fruit.

The morphological study showed that fruit infused for different lengths of time with eosin red stained the vascular system differentially. Sections revealed that the vascular system permeated the entire mesocarp and then coalesced to enter the testa in the micropylar region. This functional connection was apparently lost when the testa

aborted prematurely. The ultrastructural study revealed different types of xylem vessels in the mesocarp tissue as well as polyphenol oxidase activity in the micropylar region of fruit with degenerate testas.