

Root Pruning and Hedgerowing of Avocado Trees at Westfalia Estate: What Have We Learnt?

D.J. Roe J.S. Köhne

Merensky Technological Services, PO Box 14, Duivelskloof 0835

ABSTRACT

Hedgerowing to optimise orchard tree density and mechanical root pruning to reduce vigour of recently rejuvenated avocado trees was carried out at Westfalia Estate. Hedgerowing was more promising in a drier, less optimal growing environment at Mooketsi, and less so in a warm moist environment. Root pruning of avocado trees was expensive and had no desirable effect on rejuvenated tree vigour.

INTRODUCTION

Due to warm, moist summers and deep, a well-drained soil, one of the major problems encountered in most of the South African avocado-growing areas is excessive tree vigour. Young trees tend to grow into each other prematurely, resulting in the necessity to remove trees before they have paid for themselves. The high vigour continues, resulting in further early tree thinning. It was observed in Israel that *hedgerowing* is successful on commercial scale under conditions there. We tested hedgerowing as a technique to delay thinning and attempted to keep orchard density at 200 (Moketsi) or 400 (Evenrond Farm) trees/ha.

The vigour problem is further exacerbated when large trees have been pruned back for rejuvenation. The root to shoot ratio is greatly in favour of roots, and the result is extremely vigorous vegetative shoot growth. We tried root pruning as a means of artificially removing roots, thus restoring the root: shoot ratio and decreasing the vigour of shoot growth.

HEDGEROWING OF HASS TREES

The test was done at two sites: Evenrond Farm (a warm, moist area) and Mooketsi (a hot, dry area). More details of the pruning sites were given by Köhne & Roe (1995).

Evenrond

At the time of first thinning in 1994, an ultra-high-density planting of Hass/Duke 7 trees was thinned to a density of 400/ha using two configurations. In the first, alternate diagonal rows were removed, resulting in hedgerows at 7 m x 3,5 m, and in the second, every second row was removed to lone-standing trees at 5 m x 5 m spacing (figure 1).

Annual post-harvest light pruning was done to keep hedgerow shape.

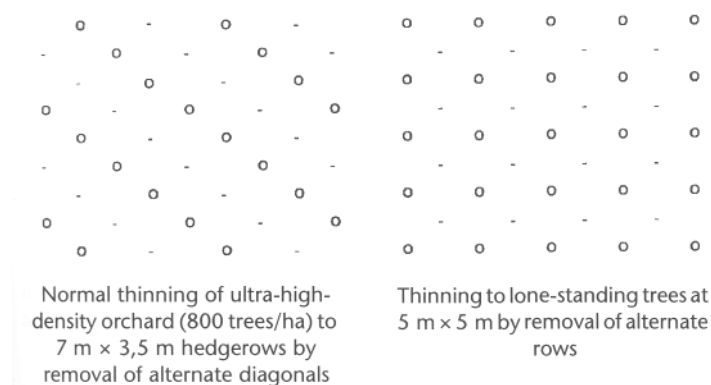
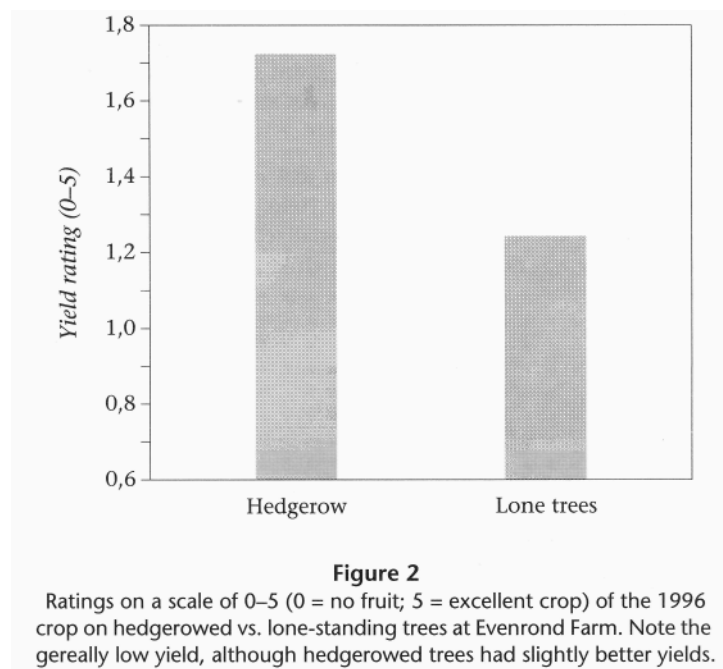


Figure 1
Schematic representation of the two tree-thinning configurations evaluated at Westfalia Estate. Removed trees are represented by -, and trees remaining in the orchard by o. In each case the remaining tree density was 400 trees/ha

The results have been confounded by drought. During the drought tree vigour was low, but last season's record rains brought almost uncontrollable growth. Yields have also been poor in the past (Köhne & Roe, 1995) and the crop for 1996 is no exception (figure 2), although this was probably due more to drought than thinning technique. At this stage we cannot recommend hedgerowing of Hass trees under high summer rainfall conditions.



Mooketsi

Hass trees planted at 7 m x 7 m, which were overcrowded, were pruned (after harvest in 1993) to hedgerows with sides approximately 15° from the upright. Annual light pruning was carried out to keep the hedgerows separate (figure 3).

The crop at Mooketsi looks slightly more promising for 1996 than in 1995. Shoot production inside the canopy has been good and a good crop is expected on these new shoots. Under the drier environment of this area hedgerowing is a practice which holds promise for overcrowded orchards.

ROOT PRUNING

At Westfalia Estate an orchard had been pruned back heavily to be rejuvenated about one year prior to our root pruning trial. The growth was excessive with pole-like branches about 4 m long being produced in a single season. Using a Ditch-witch machine, a trench about 80 cm deep was dug around each tree. The trenches were made about 3-5 m from the trunk, at the drip line of there grown branches (the machine could get no closer), but it would have been beneficial to get closer and cut off more roots. The cost of the trenches was about R50/tree.

As expected, most of the roots were found in the upper 30 cm of soil, with about 80 % in the leaf litter layer. Very few roots were found deeper down (figure 4) — apparently the trenching had cut about 90 % of the roots. A point of concern, however, was that the cut roots were ideal sites for attack by root rot pathogens, especially during wet years.

We expected to see differences in leaf stress symptoms, fruit drop, vegetative vigour and possibly yield, following root pruning. None of these differences materialized and the expense of root pruning was not deemed worthwhile.

In our view root pruning was impractical and did not produce the desired effects.



Figure 3

Hedgerows at Mooketsi about one year after major pruning to hedgerows



Figure 4

Root distribution in recently root pruned Hass stumps. Note the proliferation of roots in the leaf litter layer.

ACKNOWLEDGEMENTS

These projects are jointly funded by the HM Foundation and the South African Avocado Growers' Association. The management inputs of Koos Coetzee and Jan van Eyk, and the technical assistance of Terrence Mookamedi, Malan Selowa, Oscar Shiburi and Alfred Tema are gratefully acknowledged.

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KÖHNE, J.S. & ROE, D.J. 1995. Progress report on pruning of Hass avocado trees to hedgerows. *South African Avocado Growers' Association Yearbook* 18: 61.