Canopy Management

South Africa

Most of the avocado production in South Africa is in areas that have a summer-wet subtropical climate which encourages vigorous vegetative growth. Research on canopy management has been carried out for a number of years by Dr P. Stassen, Institute for Tropical and Subtropical Crops, Nelspruit in the direction of intensively training 'Hass' trees to central leader form (Fig. 30). During our time in South Africa we saw no evidence that the industry had accepted the results from Dr Stassen's research programme. Instead. Canopy management was being practiced along the lines developed in Israel where trees were being strategically pruned with mechanical saws and the regrowth treated with the growth retardant, Sunny®.

Fig. 30 Training 'Hass' trees to central leader form at the Burgeshall Research Station, Hazyview.

Canopy management as practiced by Westfalia Estates involves pruning trees twice each year: in the winter as soon as the crop has been harvest the trees are given a light prune (usually by hand) to remove any material that falls outside the main shape of the tree and again in early summer to establish the fruiting platform for next season. The trees are treated with 0.7-1.0% Sunny® at mid-bloom to encourage increased fruit retention and larger fruit. The summer regrowth is also Sunny®-treated when about 100 mm of shoot growth has occurred using 0.3% Sunny® plus a follow-up with 0.2% Sunny® 2-3 weeks later if required. For major re-shaping of trees the alternate sides are mechanically pruned in consecutive years so as to retain at least one productive fruiting face on the trees. In this instance the heavy cut is made in the winter as soon as the crop has been harvested.

Canopy management was also discussed with André Ernst of Allesbeste Nursery who also has a large avocado orchard. André is able to maintain 15-20 t/ha on pruned 'Hass' orchards that are planted at 5 x 7 m while still keeping trees to a manageable size. It was also claimed that the pruning strategy followed reduces the intensity of alternate bearing. The following steps in pruning for this orchard were described as follows:

- the severe prune when starting the process is given to only one side of the hedgerow in the first year with the canopy being cut back to within 2 m of the trunk immediately following harvest (about July). The second side of the hedgerow is similarly pruned the following year immediately following harvest (Fig. 31).
- The pruned side of the hedgerow is summer-pruned (December/January) and the regrowth treated with Sunny® when regrowth is about 50-100 mm long. It is usual to give two Sunny® sprays about two weeks apart using 0.25% each time. The second spray may be omitted if regrowth is sufficiently controlled

Fig. 31 Pruned and Sunny®-treated Hass Trees at André Ernst, Tzaneen, SA.

with the first spray and cold weather occurs early enough to stop growth. Agral® is added to the Sunny at 0.01%. It has been noticed that zinc leaf concentrations have fallen to lower levels in the pruned blocks compared to the unpruned blocks of trees.

Hall and Sons, Tzaneen had crowded, overgrown orchards which they were just beginning to rejuvenate. Interestingly, they were being advised by Dr Nigel Wolstenholme who had recommended that they follow the Anderson selective limb removal canopy management strategy so that crowding could be reduced whilst still retaining orchard productivity (Fig. 32). Although in the early stages of bringing the orchards back under control the manager of the programme was satisfied on the results being achieved.

Fig. 32 Selective limb removal being practiced for canopy control at Hall & Sons, Tzaneen.

Florida

The Florida avocado industry suffered severe damage following Hurricane Andrew which struck in the summer of 1991. The lesson learnt from this storm was that trees that topped to about 5 m or less suffered less damage than trees that were allowed to grow taller. While topping in most orchards is still practiced there is no consistency between farms on the overall management of orchards. Selective limb removal was being practiced by one grower who was feeling hi way with the technique but claiming that his orchard was now more productive than when he was hedging both sides of the trees. There were many orchards where the side canopies were poorly lit and fruiting had retreated to the tops of the trees. In these cases growers seemed unwilling to make a decision to prune. The overall impression was there was little to be learnt with respect to canopy management in Florida.

California

The Californian industry is the home of close planting followed by progressive tree removal until finally when the remaining trees become too large the orchard is stumped and allowed to regrow. While in theory this option can work well in practice it does not always work out as growers become reluctant to make timely removal of trees. There was some evidence that this system is still being practiced by some growers but there are also many orchards where crowding has occurred and the fruiting has moved to the tops of the trees.

Ultra-high Density Orchards

Ultra-high density avocado orchards are currently being promoted in California by the Chairman of the CAC R&D committee Mr Reuben Hofshi. Several orchards have been planted in different localities in the state and have clocked up impressive production figures. The concept involves planting varieties with natural central leader architecture such as ‘Reed’ and ‘Lamb Hass’ at 2.25

Fig. 33 An ultra-high density orchard of 'Reed' in its 5th year where it produced 65 t ha^{-1}.

x 2.25 m spacing (1973 trees ha^{-1}). Trees are annually pruned, usually after the current season's crop has set, to ensure that they do not occupy more than their allocated space in the orchard. Pruning is aimed at maintaining tree shape, height, light interception and orchard access while ensuring productivity is maintained. Tree height is maintained at a level that allows hand harvest of all fruit from the ground. A six-year-old 'Reed' orchard has yielded 6.5, 26.0, 65, and 81.7 t ha^{-1} in the third to sixth years from planting, respectively. Current limitations to this production system are market acceptability of cultivars with suitable architectural structure for close planting, e.g. 'Gwen', 'Lamb Hass', and 'Reed', and the cost/return of this production system based on the life of the orchard which has not yet been practically quantified. There is no doubt that this work is pushing the production system to its limit and with some modification the practices used by Hofshi may have value for the Australian industry for the production of 'Reed' and 'Lamb Hass'.