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CURRENT STATUS OF CANOPY MANAGEMENT IN AUSTRALIA

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The aim of these notes is to outline historical and current trends of canopy management in Australia.

Background

Main growing environment. Australia has a wide range of growing environments from the wet tropics of North Queensland to the dry Mediterranean climate of southern Australia. The canopy management techniques of one environment are often not applicable to another. These notes relate to the main production area of the country, which is the subtropical region of coastal Queensland and New South Wales.

> Area: Northern New South Wales and South East and Central Queensland
> Latitude: 25 to 30 degrees South
> Altitude: Sea level to approximately 300 m
> Climate: Warm to hot summers, cool to warm winters, mainly summer rains but in southern parts some rain all year round. Most orchards are irrigated.

Tree spacing. On average most established orchards are at about 10m by 8m. The trend is for a closer spacing of about 8m by 5m. This is still quite wide by world standards but the extremely vigorous growth and the limited registration of Plant Growth Regulators should be borne in mind.

Main varieties. Predominantly 'Hass', followed by 'Sharwil' (Australian selection which prefers warm environments), 'Wurtz' (a semi-dwarf tree with a dense canopy) and 'Shepard' (an early season greenskin which can only be grown in the warmest areas of the environment). 'Fuerte' is disappearing due to its susceptibility to anthracnose and insect damage. The trend is for a greater proportion of 'Hass'.

How long fruit is on the tree after reaching maturity. Fruit are harvested from the time of reaching commercial maturity for approximately 4 months. 'Shepard' is picked for the early market as soon as it matures from about March onwards. 'Hass' does not reach maturity till July in the coolest regions and is sometimes left on the tree till November to get the better late season prices.

Main rootstocks. Guatemalan, e.g. Velvick which is locally selected for its vigor and tolerance of root rot.

Clonal rootstocks. Only about 2% of trees are on clonal rootstock. There is great potential for improved orchard productivity, quality and uniformity as a result of the wider adoption of clonally propagated rootstocks from superior selections.

Canopy management

Main canopy management issues

- Overgrown orchards.
- Decline in productivity and fruit quality in large trees.
- Extra expense in harvesting large trees.
- Safety risk for the pickers of large trees.

Decline of fruit quality in overgrown trees is partly attributed to poor spray coverage and partly to less efficient trees. The main aim of canopy management is to improve light penetration to recover yield and fruit quality and to make orchards easier to manage mechanically (labor rates are expensive in Australia so wherever possible orchard tasks are mechanized).

Tree training aims and practices in young non-bearing trees. Traditionally growing tips of side branches are pinched out to encourage multiple branching and side shoots for more flowering points, however this can also result in a more rounded tree shape. Some change is occurring to this approach in order to develop trees with a more upright structure. Very low branches that may interfere with irrigation sprinklers or herbicide treatments are removed.

Canopy management aims and practices in bearing trees. The aim is to maximize light interception and at the same time keep the tree to a size that can be managed practically and economically for:

- productivity and quality
- good spray coverage
- easy and efficient picking
- accessibility to machinery between rows.

Various methods of canopy management are being used, some are regarded as outdated and others as experimental:

1. **Tree thinning.** Alternate trees are removed as crowding develops.
2. **Staghorning.** Periodically all the trees in the block are cut back to a bare scaffold above the graft then allowed to re-grow.
3. **Individual limb removal.** One or two large limbs are selectively removed every few years from each tree to allow more light into the canopy ("window pruning") and to keep tree size down.
4. **Hedgerowing with a mechanical saw.** This is usually done at an angle to the vertical axis.
5. **Hedgerowing with plant growth regulators (PGRs).** PGRs are applied to control vegetative vigor.

Tree thinning and staghorning are "tried and trusted" but growers are now looking for a system that gives both long-term sustainability and less disruption to their cash flow.

Amount and timing of mechanical pruning. Australia has a wide range of harvest times due to the diversity of geography and climate. In SE Queensland most harvesting would be over by late winter. As soon as harvest is complete but before the hot weather begins (to avoid sunburn) most major pruning is done. Recent trials entail pruning the leaf flush in spring and/or summer with a mechanical pruner then applying a PGR to the re-growth to limit its development. *(Editors' note: At the current time the use of plant growth regulators*

are NOT approved for this use in California. CAC/PRC is currently funding research examining the potential of PGRs for California avocados.)

Ideal tree height. About 4.5 to 5 meters is considered the ideal or maximum tree height in Australia at present.

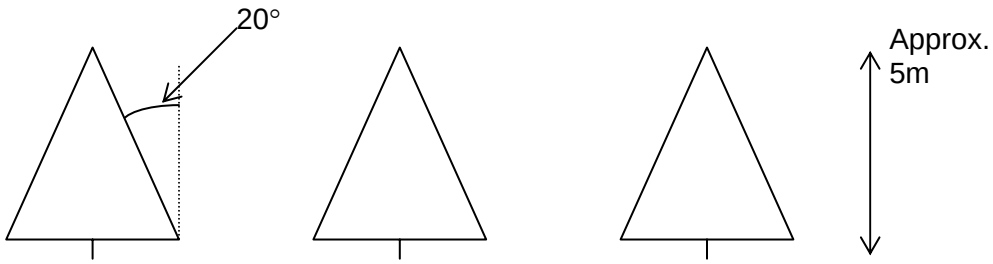
"Ideal" tree shape. A pyramid shaped hedgerow is gaining interest as the "ideal" tree shape in Australia.

Level of adoption of practices. Most growers are aware of the need for canopy management and practice some form of it. No single method is currently used more than the others are and it is unlikely that one single approach will be best in all circumstances. Canopy management is recognized as a complex issue that depends on the environment and the circumstances of each situation for its solution. It is currently one of the biggest issues for growers and they are keenly awaiting research results.

Yield and quality responses to canopy management. In general it can be said that fruit quality (including fruit size) improves as a result of most canopy management practices. Yield generally picks up 2 or 3 years after a major pruning job. In a well-managed orchard in SE Queensland it has been shown that the orchard can be back into full production 3 years after a staghorning operation.

Research currently underway. Research investigating mechanical hedging in combination with PGRs is currently being conducted in Australia:

1. Initially major tree shaping is conducted. If possible this is done in the cooler months as soon as harvest is complete. It may entail cutting 1 to 2 m of growth off in late winter to get the desired shape and size. The operation is conducted with a mechanical circular saw at an angle of about 20 degrees to the vertical and is designed to leave a pyramid shaped hedgerow with tree height being achieved concurrently where the cut on each side of the tree meet. If this results in major sections of limbs exposed to possible sunburn then these areas are painted with a white plastic paint.



2. During the warmer months after fruit set, trees are again mechanically trimmed but this time only lightly to remove some of the new leaf flush without damaging too much of the fruit. Usually no more than 25cm of growth is removed. When the resulting leaf re-growth is about 15cm long it is then sprayed with a PGR (Sunny®; at the present time this product is only available experimentally for use on avocado in Australia). Current research efforts are examining the timing of trimming and spraying.

Dealing with overgrown trees. Traditionally these trees are staghorned and measures are taken to avoid sunburn. Sometimes a “nurse branch” is left at staghorning especially on sick trees. This is removed after a significant amount of the new canopy has grown. More recently mechanical side pruning is practiced as outlined above.

Use of PGRs. As outlined above. Also, paclobutrazol has been used for some years on ‘Hass’ as a strategically timed foliar spray to increase yield and/or fruit size and has some temporary effect on slowing vegetative growth.

Final comment

It must be remembered that a wide range of growing environments exists in Australia from the wet tropics of North Queensland to cool Mediterranean winter rainfall areas of southern Australia. Canopy management is a complex issue and no single canopy management system will work in all areas, however the principle of canopy management in all areas is recognized as being one of managing light better.