



Avocado Tree Pruning in Chile

Part II

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Current situation in Chile

- Orchards are primarily planted on slopes.
- Planting densities are high (18x9, 15x9, 15x6, 12x6 ft).
- Maintenance and labor costs are rising.
- High cost of production.





- Older orchards were planted with wide spacing 21x12, 24x24, or 30x30 ft.
- These orchards normally have lower yields with small fruit size, and harvest late in the season, which makes it difficult to prune at the correct moment.





In unpruned orchards, trees become overcrowded, with dense canopies and very low light in the interior.

This is translated into large areas of the lower and interior canopy which are not productive due to shoot loss.



- The effect of correct canopy management on fruit quality was summarized by Throp *et al.* (2001):
 - Fruit size is increased.
 - Fruit is healthier with fewer internal and external disorders.
 - Fruit has better post-harvest and storage qualities.
 - Fruit is free of disease.



Fruit production implies light interception and conversion into plant biomass. The factors which mainly control this process include (Wünche and Lakso, 2000):

- Quantity of radiation received: determined by the climate and growth period. This cannot be modified.
- Percentage of radiation that is intercepted by the trees, where there is the greatest potential for intervention. The shape of the tree and its pruning can affect the percentage of light intercepted. Tall trees, that are wider at the base, have the greatest canopy area exposed to the light.
- Plant efficiency for converting energy into fruit. The objective is to have less wood and more fruit. Reducing tree size and the quantity of structural wood (long branches), can achieve greater yields of larger caliber fruit, without greatly reducing tree productivity.



Why prune?

- To increase the area exposed to light (improve number of flowers and increase fruit quality).
- To reduce the harvest costs. In Chile, depending on the pickers, pay is between 5 to 10 cents per kilo.
- To reduce alternate bearing (reduce ON/OFF years).
- To renew branches that have been scored and already harvested.



Scoring

- Increases shoot reserves.
- Increases flowering intensity, which increases fruit set.
- Time, 15 of April – 31 of May (autumn).
- October 15 - 31 in the Northern Hemisphere.
- Scored branches should be removed after harvesting.



Correct conditions for scoring

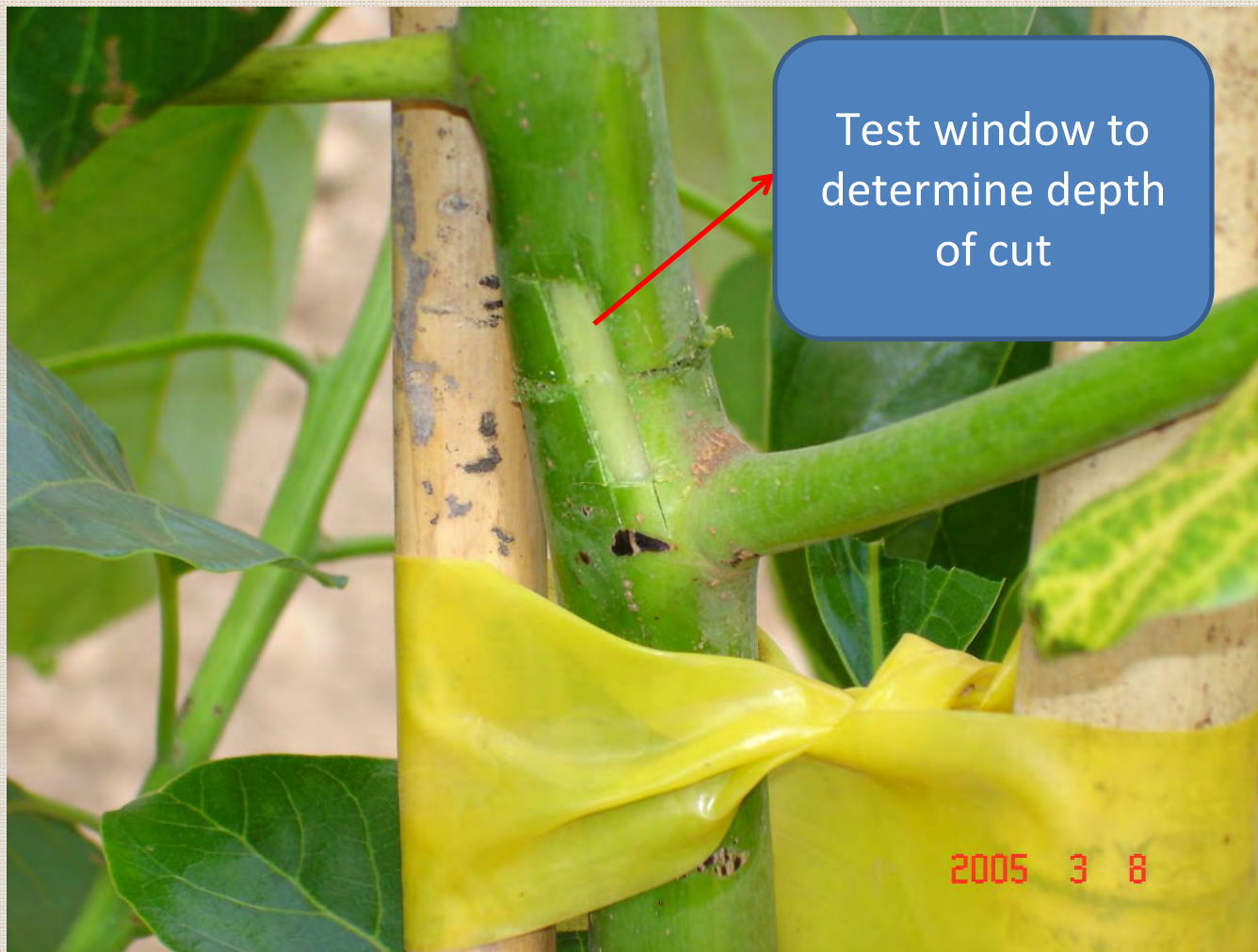
- Vigorous orchard (above 2.4 – 2.6%N).
- It will affect a canopy area of less than 30% of total foliage (it should never be beyond one third of the foliage).
- In the bark, it is only the phloem, not the xylem, that must be cut.
- In the first year, it should be done with a metal saw or knife.











2005 3 8













- With scoring, alternate bearing is concentrated on certain branches, thus reducing it overall within the tree and the orchard.
- Pruning must be closely managed with scoring, as scored branches should be removed (17 or 20 months after scoring) and renovated.





Correct conditions for scoring:

- Wood should be at least 1.5 inches in circumference, cutting tools should be adapted to cut 1 to 2 mm, so as to cut only the outer bark.











2006 3 15



Very badly done,
phloem should not be
entirely destroyed.







When should we prune?

- In Chile avocados are harvested from July (SH, spring) until March-April (autumn), which makes early pruning difficult.
- Pruning must be coordinated with the harvest. Many times we harvest the branches which must be pruned first, leaving the rest of the fruit on the tree until later in the season.



Objectives:

- Maintain yields
- Improve caliber curves
- Maintain production in the lower canopy
- Renovate old growth and remove scored branches.

Criteria:

- Illuminate the center of each tree
- Keep between-row space free.
- If necessary, thin the flowers to avoid excessive production.



How old should trees be to begin pruning?

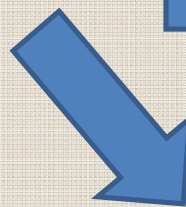
Canopy management should be done from the moment of planting.

- The first year, the tip of the central leader should be pruned, to increase lateral branching, also increasing the foliage by scoring in the first season.
- The second year, pruning should be done in the summer on the tips of the lateral branches which were not previously scored.
- The third year, the central leader which has already produced fruit should then be removed.





5x2 Orchard, in the third year.





Pruning cuts should be
done between 1 and 1.5
meters

To maximize light interception, small canopies are needed





4 yr-old orchard, at 5X3

2009 12 30



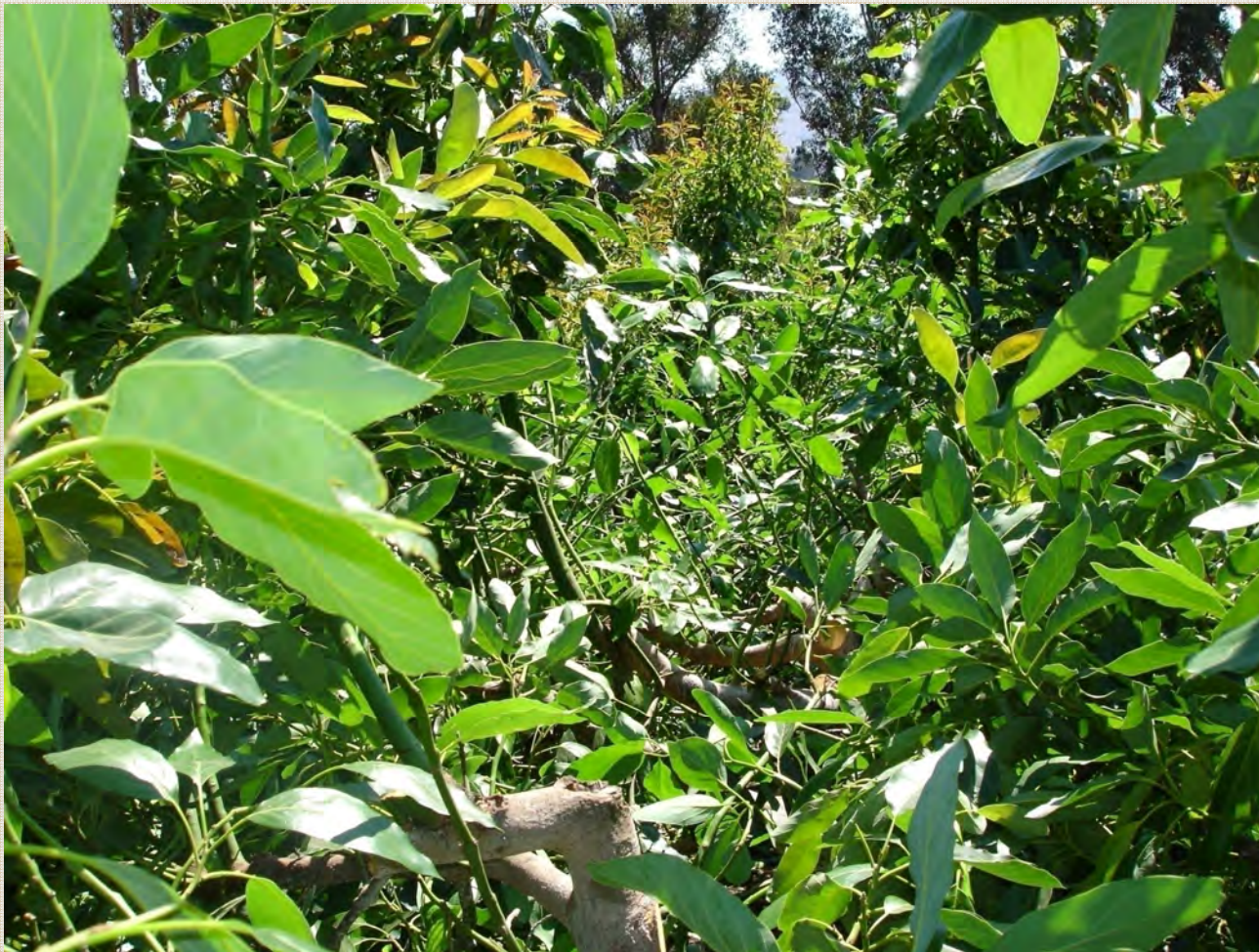




6 yr-old orchard at 5 x 3 m

















5 yr-old orchard, at
5x2 m, after pruning.





Strategy for mature orchards:

- Cut individual branches; preferably those that are located on the north in the Southern Hemisphere (South in the Northern Hemisphere).
- Cut at least one to two meters below the final height of the trees according to the planting design.
- Pruning is very important for eliminating old wood, as well as rejuvenating the trees.
- In terms of productivity it is better to prune trees individually than in hedges, to improve light interception within the canopy.



- In cases of extreme shading, the branches which must be removed can be marked at harvest, where 100% of their fruit will then be harvested before pruning.
- Height of the lower branches in orchards with micro-sprinklers should be at least 50 cm above the soil level.

Marked branch
identified for
later pruning











3 months after pruning, if the cut is sufficiently illuminated, a growth response should be seen





- Mechanical pruning is inexpensive, but very inefficient at improving light interception (hedges).
- This type of pruning leaves large cuts at greater heights in the trees, which makes control of re-growth more difficult, and produces overcrowding in a very short time.







Flowers are only produced high in the canopy, making it difficult to prune without greatly reducing yields.

During the season, January (July in the Northern Hemisphere), shoots from a heavy pruning can be thinned, eliminating the most vigorous “suckers” and badly placed branches.

In autumn, after scoring, prune all overly vigorous growth, and new red-colored suckers (but not weak red shoots). This pruning can be done between April and May (October and November in the Northern Hemisphere).

Badly done autumn pruning, as too much productive material was lost.















10 x 10 m orchard,
with renewal of
structural branches.
You can see that the
canopy has been
opened up for light
interception.





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PRUNING SEMINAR





FLOWER THINNING:

Autumn – Winter.

Before a year of high flowering.

Remove 20% to 30% of the terminals.

FRUIT THINNING:

During bloom and fruit-set.

In a year of high flowering.



Yields of past 6 years, inland orchard (Llay Llay).

| Age | Distance feet | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|---------------|------|------|------|------|------|------|------|------|
| 1998 | 18 x 12 | 17,3 | 19,5 | 28,2 | 16,1 | 12,4 | 25,6 | 26,5 | 13,4 |
| 1994 | 18 x 12 | 16,8 | 10,9 | 25,7 | 15,2 | 21 | 20,9 | 17,4 | 17,7 |
| 1996 | 18 x 12 | 25 | 7,6 | 29,7 | 13,7 | 25,1 | 17,7 | 24,3 | 21,2 |
| 2000 | 18 x 12 | 6,7 | 10 | 17,5 | 15,4 | 21,2 | 19,7 | 20,9 | 18,1 |

Thousand Pounds/acre



Yield of past 4 years, coastal orchard (San Pedro)

| Age | Distance feet | 2008 | 2009 | 2010 | 2011 |
|------|------------------|------|------|------|------|
| 1999 | 18 x 10 | 7,5 | 37,2 | 12,0 | 20,0 |
| 2002 | 18 x 10 | 9,3 | 23,1 | 15,5 | 18,0 |

Thousand Pounds/acre



Other Pruning in Chile

- Between row pruning (lanes). Unlike the previously described pruning strategies, this strategy prunes trees on every other row, on both sides.

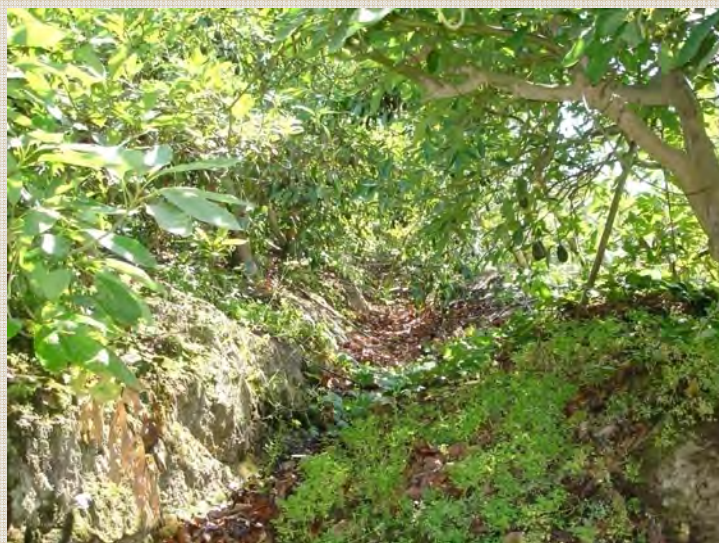
This way there is greater illumination.

The following row can be treated two years after pruning the first rows in this way.











Some Conclusions:

- Avocado trees should be pruned every year.
- Pruning should be done in accord with the time of year in which it is done, such as a heavier and more aggressive pruning being completed earlier in the season.
- If pruning is done late in the season, it should be done with the objective of maintaining some of the material to produce flowers the following season on the summer and fall shoots.



Some Conclusions

- Overcrowding should be avoided, especially when it blocks the rows.
- It is always time to prune (except in cooler climates with risk of frost damage).
- Ideally, pruning should consist of removing branches that have already produced fruit (scored branches from the previous year), which were sweep-harvested earlier in the season. These branches can be marked for easy identification later .



Thank you very much!

