

*High density cultivation: a case study of central leader pruning  
with Maluma*



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*By*

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*Allesbeste – South Africa*



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# *Introduction*

With *high density plantings* becoming increasingly popular, a need has developed for *pruning techniques* and cultivars supporting this cultivation method. *Central leader pruning (CLP)* is well suited for high density planting as it enables greater *space utilisation*. *Maluma* has been identified as a cultivar that is well suited for central leader pruning methods.

This study documented the central leader pruning techniques followed by Allesbeste Boerdery, on the farm Allesbeste, Tzaneen, South Africa (23°48'27"S, 30°07'19"E).

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## *Introduction – Problem Statement*

High density plantings have been identified as a solution to the increased pressures on farming due to input costs of production and the efficiency of farming.

Higher Productivity & Profitability per hectare, and economies of scale need to be achieved

However High Density Plantings have not been adopted globally as sustainable cultivation and pruning methods still needs to be identified in most cases.

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## *Introduction – Objective*

- To identify a central leader pruning technique
- To monitor the response of trees with this technique
- To monitor the success of this method in terms of
  - Sustainability
  - Flower
  - Post Pruning production
- To evaluate Maluma as a suitable cultivar for high density plantings and Central Leader Pruning

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# *The General Pruning Problem*

- Overgrown trees
- Vigorous Re-growth
- Intensity of pruning
- Canopy Boundary Production
- Yield sacrificing and losses?
- Methods?

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## *Premises for Pruning*

- Increased light penetration within the tree to keep shoots active
- Tree size and shape maintenance for effective light utilisation
- Maintaining tree size and shape for effective tree management
- Encouragement of regular branch renewal ensuring that new wood becomes available for fruiting
- To obtain tree complexity for maximum bearing units for maximum production.

(Snijder, 2001)

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## *Premises for High Density Plantings*

- Low prices require efficient farming and increase in productivity.
- Young trees are vigorous, produce large fruit early, have better canopy to root ratio and reach full production by 7 or even 8 years.
- Easier and less expensive to harvest.
- Effective and more practical spraying  
(Hofshi, n.d.)
  
- Spatial utilisation

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## *Prerequisites for High Density Plantings*

- Cultivars are an important consideration. Hass trees on high density plantings may become problematical after a few years as they expand equally on all sides as they grow. Upright growers such as Gwen, Reed and Lamb Hass are better suited.
  - Availability of reasonably priced clonal trees
  - A plan for tree manipulation to extend the sustainability of high density.
  - Tree removal rather than rejuvenation when productivity begins to decline.
- (Hofshi, n.d.)
- Dwarfing trees or rootstocks?

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## *The Suggested Method – Central leader*

- A-shaped tree or,
- Cylindrical tree
- Obtained by removing vertical growth
- Cultivar selection critical
- Early training is critical

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## *Volumetric Production Capacity*

- Conventional methods

Trees are large and produce majority of fruit on canopy border

- Central leader pruning

Small trees are maintained and through increased light penetration the full capacity of each tree is used

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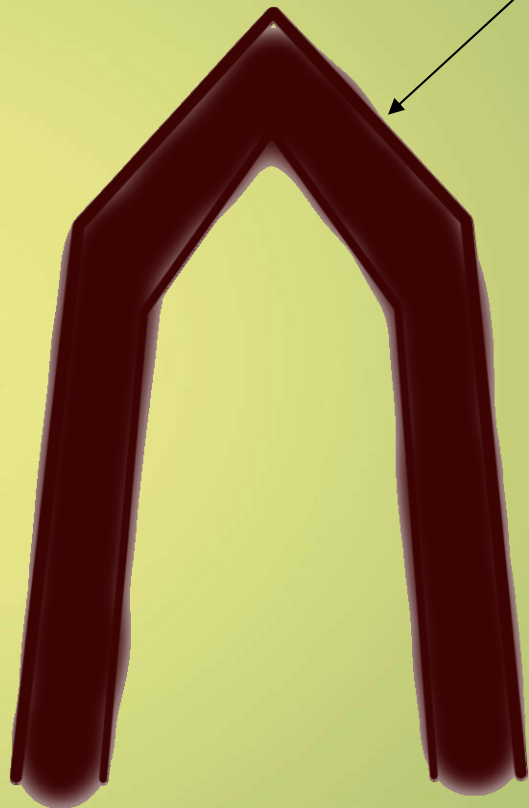
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# *Volumetric Production Capacity - Illustrated*

Volumetric Production Capacity



Conventional orchards



High density CL orchards

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# *Volumetric Production Capacity*



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## *Methodology - Equipment*

- 1 Tractor
- 3 Labourers
- Pneumatic loppers
- 4m height guide
- 2 Maluma orchards

\*Adapted method

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# *Methodology - Orchards*

- Two orchards used
  - Block: D5
    - Cultivar: Maluma
    - Size: 12.9 Ha
    - Date planted: April 2009
    - Irrigation: Micro Sprinklers
    - Spacing: 7 x 3, 5 (tramline, Figure 1)
    - Trees: 10709 (830 trees/ ha)
  - Block: E4
    - Cultivar: Maluma
    - Size: 2 Ha
    - Date planted: November 2006
    - Irrigation: Micro Sprinklers
    - Spacing: 7 x 3, 5 (tramline, Figure 1)
    - Trees: 1632 (816 trees/ ha)

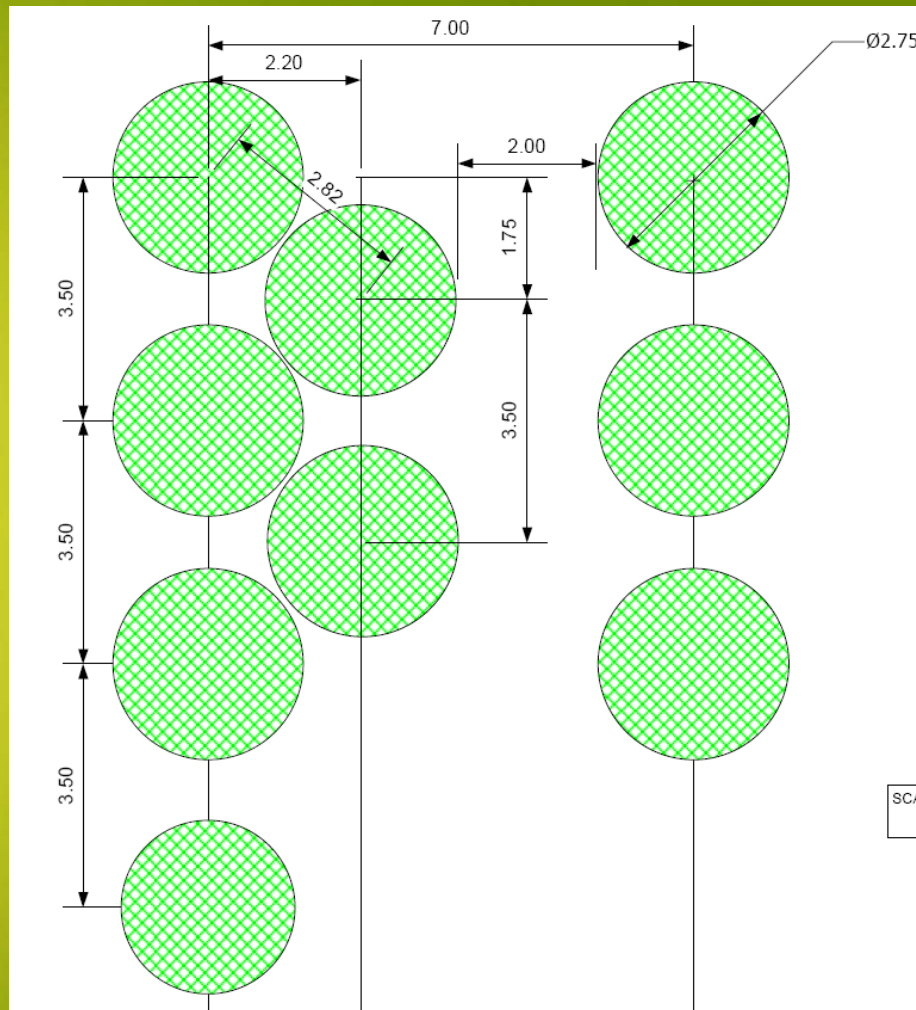
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# Methodology - Tramline Planting



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# Orchard 1 – D5



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# Orchard 1 – E4



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## *CLP – Process: Young trees*

1. Identify the central leader
2. Remove other vertical growth
3. Growth with an angle smaller than  $45^\circ$  to the central leader is removed.
4. Any lateral branches that grow inward, into the tree, towards the central leader, as well as those that cross other branches need to be removed

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## *CLP – Process: Young trees*



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## *CLP – Process: Young trees*



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# CLP – Process: Young trees



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## *Methodology – Process: Maintenance pruning*

1. Remove vertical growth, other than central leader
2. Growth with an angle smaller than 45° to the central leader is removed.
3. Any lateral branches that grow inward, into the tree, towards the central leader, as well as those that cross other branches need to be removed

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## *CLP– Process: Maintenance Pruning*



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## *CLP– Process: Maintenance Pruning*



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## *CLP– Process: Maintenance Pruning*



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## *CLP– Process: Maintenance Pruning*



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## *CLP– Process: Maintenance Pruning*



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## *CLP– Process: Maintenance Pruning*



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# Examples



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## *Example Nursery Tree*

Prominent Central Leader from Nursery



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## *Why Maluma*

- Production capability
- Natural Central leader tendency
- Lateral growth
- Less vigorous growth – shorter internodes
- Willowy branches
- Superior light penetration
- Precocity
- Post pruning re-growth
- Post pruning flower
- **NO** Growth retardants

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# *Maluma Production Capability*



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# *Maluma Production Capability*



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# *Maluma Natural Central Leader tendency*



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# *Maluma Natural Central Leader tendency*



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## *Maluma Lateral Branches*



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# *Maluma Lateral Branching*



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# *Maluma Less Vigorous Growth*

Hass



Maluma



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# *Maluma Less Vigorous Growth*



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# *Maluma Willowy Branches*



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# *Maluma Superior Light Penetration*



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# *Maluma Precocity*



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# *Maluma Post Pruning Re-growth*



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# *Maluma Post pruning flower*



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# *Maluma Post pruning flower*



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# *Maluma Post pruning flower*



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# *A Tribute to Maluma's Central Leader*



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## *Conclusion*

- Maluma is a preferred cultivar for Central Leader Pruning and High density cultivation
- Yield per hectare and spatial utilisation is increased
- Crop potential is not decreased as vegetative growth is removed without removing flower.
- Central Leader Pruning on Tramline plantings is a successful High Density Cultivation method
- Central Leader Pruning on Maluma reduces input costs and increases efficiency and effectiveness
- Prerequisites achieved
  - Cultivars, Method, Affordable trees, Tree Replanting, Dwarfing trees / rootstocks

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# Questions

Thank you

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