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# Pruning & Orchard Practices

Zander Ernst



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# Overview

- **Standard 7x3,5 Orchards (8x4m)**
  - Advantages & Disadvantages
  - Productivity
- **High Density**
  - Premises, Advantages & Disadvantages
  - Pruning
  - Productivity
- **Orchard Practices**
  - Mulching, Pruning, Moisture management, Growth control, Mechanising & Labour, Fertiliser norms.
- **Rootstock Evaluations**
  - Bounty, Duke7 & Dusa
- **Production experiments**
  - Current & Potential

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# Standard Density (7x3,5 & 8x4m)

- Industry-wide the norm
- Advantages
  - Less pruning needed
  - Less labour intensive with regards to pruning
  - Known production capabilities
- Disadvantages
  - More labour intensive with regards to picking and spraying
  - Other Orchard Practices are labour intensive
  - Possibly not optimising on production capacity

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# High Density (7x3,5 tramline, 6x3m, 5x5m, 2,5x2,5m)

- **Premise for High density**
  - **Optimising on production capacity in terms of hectares, volumetric production capacity, in other words optimal spatial utilisation of land.**
  - **Modern Fruit Production**
  - **Rate of Return on Investment**
  - **Efficiency of Production practices**
  - **Maluma is:**
    - **Precocious, Less Vigorous, Naturally Upright & Triangular, Productive, Lateral Growth**

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# High Density (7x3,5 tramline, 6x3m, 5x5m, 2,5x2,5m)

- **Advantages**
  - Picking rate
  - Spraying programs
  - Management
  - Productivity?
- **Disadvantages**
  - Development costs
  - Productivity?

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# High Density – Volumetric Production Capacity

## Volumetric Production Capacity



Conventional orchards

High density CL orchards

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# Maluma Benefits

Precocious



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# Maluma Benefits

Hass



Maluma



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# Maluma Benefits

## Natural Central Leader Tendency

- Less complex trees



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# Maluma Benefits

Good Light Penetration



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# Maluma Benefits

Lateral Branching



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# Orchard Practices - Mulching

- Healthy Root systems
- Focus on Weaker Trees First
- Good Practice
  - Compost with Lime (7kg/m<sup>3</sup>) as initial treatment
  - Avocado-wood chips
- Hypothesis: Lower density Maluma might need more focus on Mulching as slower growing trees do not create as much natural mulch as faster growing varieties. Vigorous varieties are pruned more heavily and more often, resulting in more organic matter.

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# Orchard Practices – Moisture and irrigation

- Frans Kruger
  - Correlation between Soil moisture and Quality / Shelf life
  - DFM probes to correlate with quality reports
- Ideal Soil Moisture = Optimal production?
- Over the following seasons
  - Compare soil moisture content from different orchards & production capabilities

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# Orchard Frost Damage

- Flower
  - Not resistant
  - Less affected than Hass
  - Late cold not that regular in South Africa = Less significant effect
- Fruit
  - Not affected by frost
  - Isolated cases have been reported, but none with significant losses
  - Unlike Hass, Lamb Hass and perhaps some other Hass-types

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# Orchard Frost Damage

**Maluma @ -6°C**



**Hass**



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# Growth Management

- Hedge rows

- 10x5m
- 8x4m
- 7x3.5m



- High Density Central Leader Pruning

- 6x3m
- 5x5m???
- 7x3.5m Tramline
- 3x3m
- 2,5 x 2,5m



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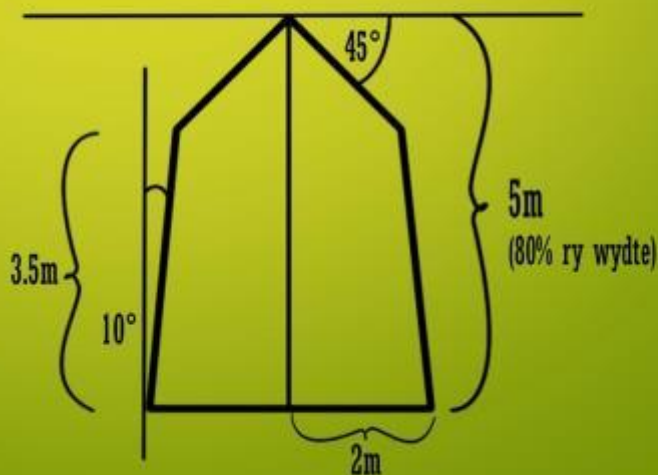


- Stap 1 - Masjiensnoei vir grootte en vorm (winter)
- Stap 2 - Verwyder ongewenste takke en skep ligvensters (handsnoei)
- Stap 3 - Uniconazole-bespuiting (Blom)
- Stap 4 - Masjiensnoei vir ongewenste lote (somer)
- Stap 5 - Verwyder waterlote & vensterinstandhouding (handsnoei)
- Stap 6 - Uniconazole-bespuiting (Groeibeheer)



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# Meganiese snoei



**Doel:**

- Verbeter ligpenetrasie deur boom
- Optimaliseer kubieke produksiekapasiteit
- Verbeter effektiwiteit van bespuitings en oesaktiwiteite
- Verjonging en verbetering van boomgesondheid en -produksie
- Konstante produksie

# Growth Management



Follow-up hand pruning



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# Growth Management

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Maluma 7x3,5m

Hass 7x3,5m

Less serious hand pruning

More serious hand pruning

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# Growth Management - CLP

- High Density Pruning = Central Leader Pruning (CLP)
- Central Leader pruning (CLP) concept
  - A-shaped tree or,
  - Cylindrical tree
  - Obtained by removing vertical growth
  - Cultivar selection critical
  - Early training is crytical
- CLP –The method
  1. Identify the central leader
  2. Remove strong vertical growth
  3. Growth with an angle smaller than 45° 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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# Growth Management - CLP



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# Growth Management - CLP



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# Mechanising & Labour

- Mechanising = Allcut pruning???
- Lower Density
  - Improved slashing equipment
  - Improved herbicide spraying equipment
  - Higher production = higher rate of picking = cost saving per kg harvested???? (given that Maluma produces higher)
- High Density
  - Possibly less slashing and herbicide sprays
  - More labour efficient spraying programs
  - Higher harvest rates due to higher production, and smaller trees = cost saving on Kg harvested

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# Soil and Leaf Nutrient Norms

- Original suggestion was to do fertilisation according to Hass norms
- Maluma produces and grows differently from Hass and needs dedicated norms
- Although production is higher Nitrogen applications could be lower than on Hass
- Important to take into account projected production as what we apply is to make up for the harvest already on the trees
- More in-depth research needed!!!!

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# Soil and Leaf Nutrient Norms

Hass nutrient removal per t/ha production

Nutrient	Amount / 1000 kg	Unit
Nitrogen (N)	9,2 kg	
Phosphorus (P)	1,4 kg	
Potassium (K)	12,5 kg	
Iron (Fe)	80 g	
Manganese (Mn)	8,8 g	
Zinc (Zn)	240 g	
Copper (Cu)	57,6 g	
Boron (B)	80 g	
Calcium (Ca)	4,6 kg	
Magnesium (Mg)	2,2 kg	
Sodium (Na)	4,1152 kg	
Sulpher (S)	8,1244 kg	
Molybdenum (Mo)	0 g	
Aluminum (Al)	93,6 g	
Chloride (Cl)	4,4876 kg	

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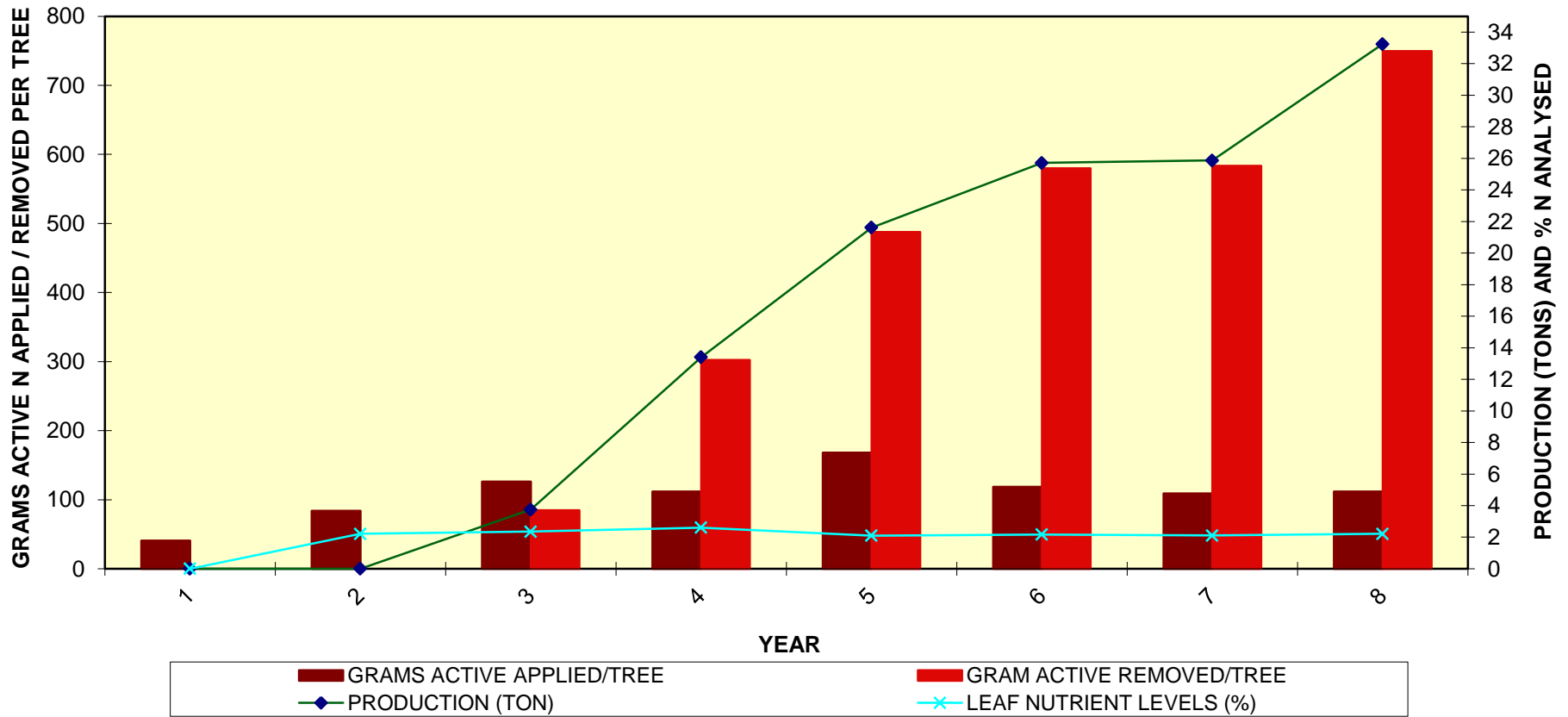


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# Soil and Leaf Nutrient Norms

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**MALUMA NITROGEN FERTILISATION**

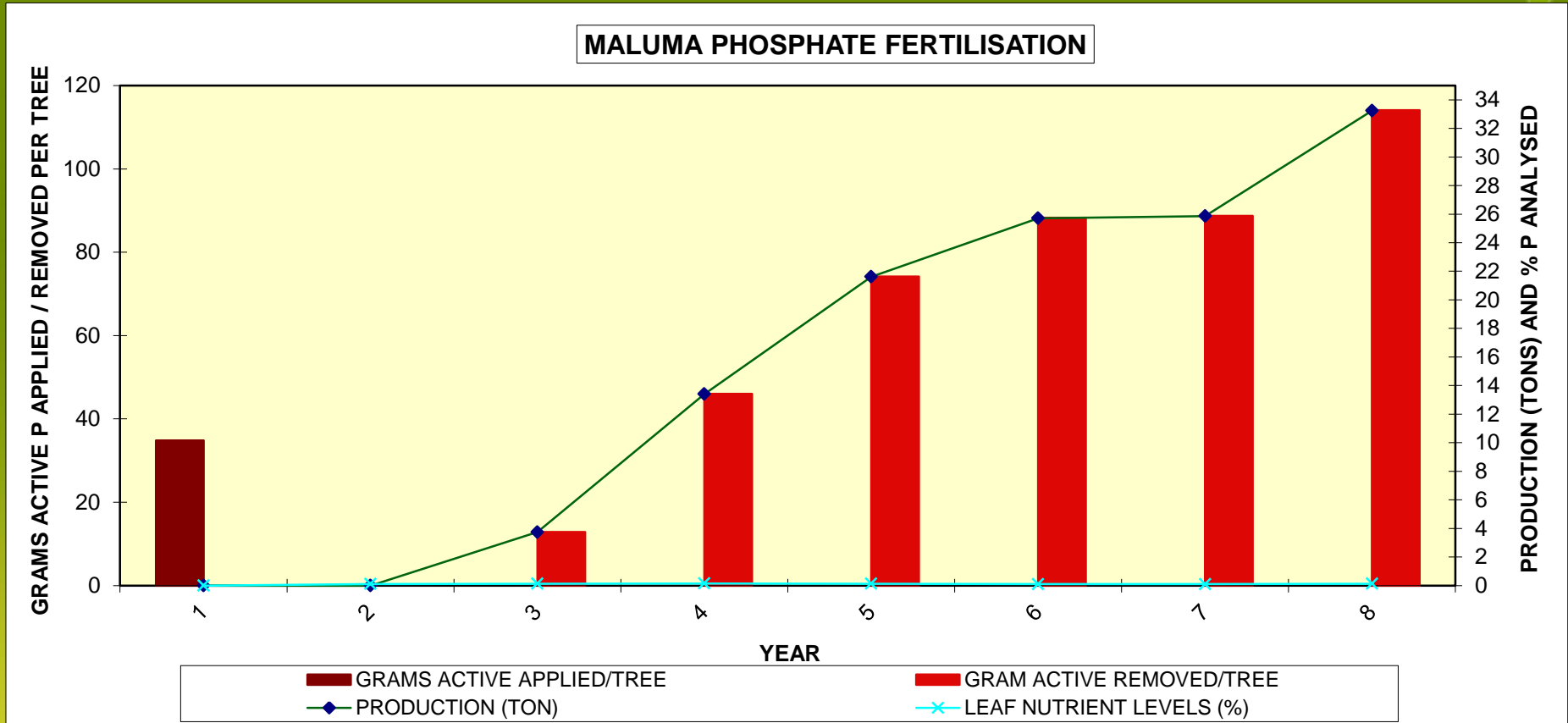


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# Soil and Leaf Nutrient Norms

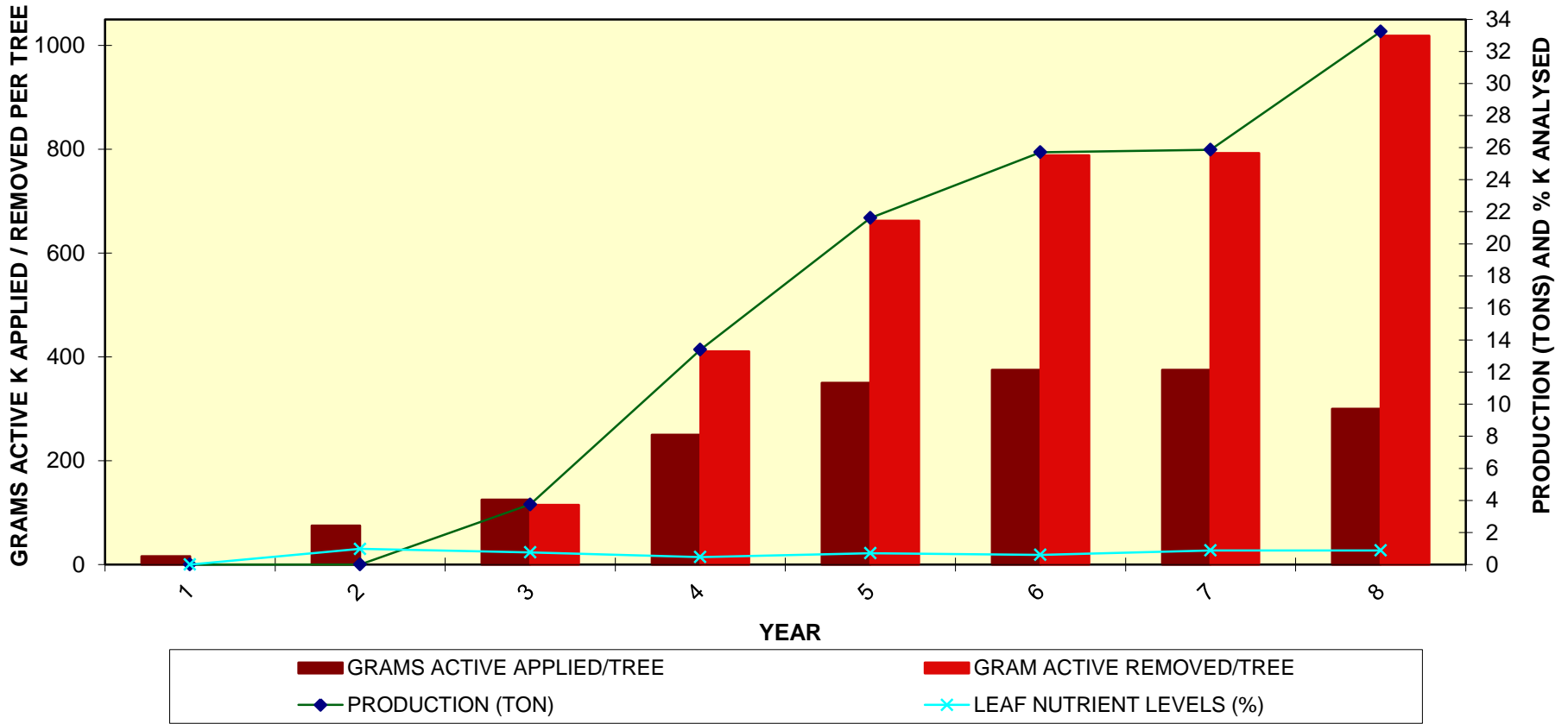
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# Soil and Leaf Nutrient Norms

**MALUMA POTASIUM FERTILISATION**



# Rootstock Evaluations

Planted September – October 2012



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# Rootstock Evaluations

## Dusa

- Advantages
  - Growth Vigour
    - – Precocity, ROI and Post pruning growth
  - Production?
  - Relative early bloom
- Disadvantages
  - Growth Vigour
    - – Might be difficult to control on high density long term
  - Longevity



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# Rootstock Evaluations

## Duke 7

- Advantages
  - Longevity?
  - Less growth vigour suited for high density
- Disadvantages
  - Initial production compared to Dusa and ROI
  - Growth pattern
  - Post pruning growth?



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# Rootstock Evaluations

## Bounty

- Advantages
  - Growth Pattern
  - Longevity?
  - Less growth vigour suited for high density
  - Definite heavy soil tolerance
  - Seems relatively dwarfing (shorter internodes)
- Disadvantages
  - Initial production is low?
  - ROI
  - Post pruning growth



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# Rootstock Evaluations

## Initial suggestions

- Standard Density
  - Dusa (depending on soil type)
    - 7x3,5m & 8x4m
- High Density
  - Duke 7 & Bounty
    - Currently most balanced
  - Dusa
    - Very promising depending on
      - Strategy
      - Further results (more production years)



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# Production Experiments

- Girdling
  - High density
  - Standard density
- Rope-experiment
- Rootstock evaluations
- High Density Variations
  - 2,5x2,5m
  - 7x3,5m Tramline
  - 6x3m
- Soil Moisture Content
- Soil Nutrient Norms



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# Future Production of Maluma

- Frost areas
- Areas with high temperatures during Hass flowering
- Top-working unproductive orchards - ALLESBESTE
- Rocky Slopes – Suited for high density
- Exporting stretched until June perhaps even July
  - Specifically in Areas where Hass is prone to Frost Damage
- **Productivity** vs Price

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# Conclusion

- Key success in terms of production:
  - High and constant productivity
  - Sustainable farming
  - Profitability back on farm
  - Ease of management and flexibility to orchard practices
- Maluma seems not to be limited in terms of production practices
- Dynamic farming
- Pushing Maluma to its limits to determine optimal production circumstances
- Progressive farming
- Sustainability for Farmer!!!!

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