

Determination of the Success of Bridge-grafting as Technique to Restore Growth in Two Girdled Medicinal Tree Species in the Southern Cape Forest Area

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GROENKOP
WITELSBOS
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**THOUSANDS OF SOUTH AFRICAN INDIGENOUS
TREES ARE BEING KILLED
ANNUALLY BY MEANS OF BARK HARVESTING!!!**



INTRODUCTION

- **Current rates of bark harvesting concerning**
 - **continuously expanding trade market**
 - **reduced abundance and slow growth rate**
 - **some have specific habitat requirements and limited distribution**
- **Medicinal trees at risk of becoming exploited to near-extinction**
- **Serious threat to tree species diversity,
genetic diversity
biodiversity**

BACKGROUND: Suppliers

- **Traditional healers (200 000)**
 - **apply traditional conservation methods**
 - **based on values, norms and cultural beliefs**
- **Commercial harvesters (63 000)**
 - **harvest as only source of income**
 - **conservation is of no concern,**
 - **traditional methods disregarded,**
 - **plants perceived as common property resource**

BACKGROUND: Users and Traders

- **Local people in various countries**
 - **Preferred above western medicine**
 - **Accessible and affordable (?)**
- **Pharmaceutical companies**
- **Phytopharmaceutical companies**
- **Health shops**
- **Alternative health practitioners e.g. homeopaths**

BACKGROUND: Resources

- **Wild resources**
 - In SA 20 000 tonnes harvested annually
 - 27% = bark
- **Imported**
 - 40 tonnes of scarce species
- **Cultivation**
 - 5 tonnes

Total = 20 045 tonnes

Trade worth R2.9 billion (2007)

BACKGROUND: Harvesting Methods

- **Strip- or patch barking**
 - used by traditional healers
 - generally non- destructive
- **Ringbarking**
 - used in horticulture
 - non-destructive
- **Girdling**
 - used by commercial harvesters
 - remove all tissue
 - highly destructive

RESEARCH PROBLEM

- Girdled trees die
- Increasing human population - higher demand
- Urbanization, agriculture and forestry = fragmentation = less trees per species
- Smaller populations – smaller genetic pool
- Slow growth rate of trees - progressively smaller trees
- Increasing demands – less + smaller trees = rapid extinction

***** Previous study (2013/2014) - bridge-grafting could be used to restore growth in *Acacia karroo*.**

RESEARCH QUESTIONS

- 1) How much carbohydrate accumulation above wound?
- 2) What are the carbohydrate levels in normal, control and grafted trees?
- 3) Do carbohydrates flow through scions?
- 4) Does girdling trigger an increase in auxin allocation to wound?
- 5) How would *Ocotea bullata* and *Curtisia dentata* respond to treatment? (Species-specific)

RESEARCH OBJECTIVES

Determine:

- 1) Carbohydrate accumulation above wound**
- 2) If carbohydrates above reduces over time**
- 3) If carbohydrate levels below wound started increasing after initial reduction**
- 4) If girdling triggers increase in auxin allocation to wound**
- 5) Species-specific responses**

TREES FOR STUDY

- *Ocotea bullata*



- *Curtisia dentata*



Methodology - Girdling

- 12 trees of each species
- 1.2m above ground – 15cm in width
- All tissue removed
- All trees to be grafted = covered with plastic sheeting



Methodology – Bridge-grafting

- Use scion wood
- Incisions into live tissue above and below
- Scions inserted and fixed
- Wound treatment

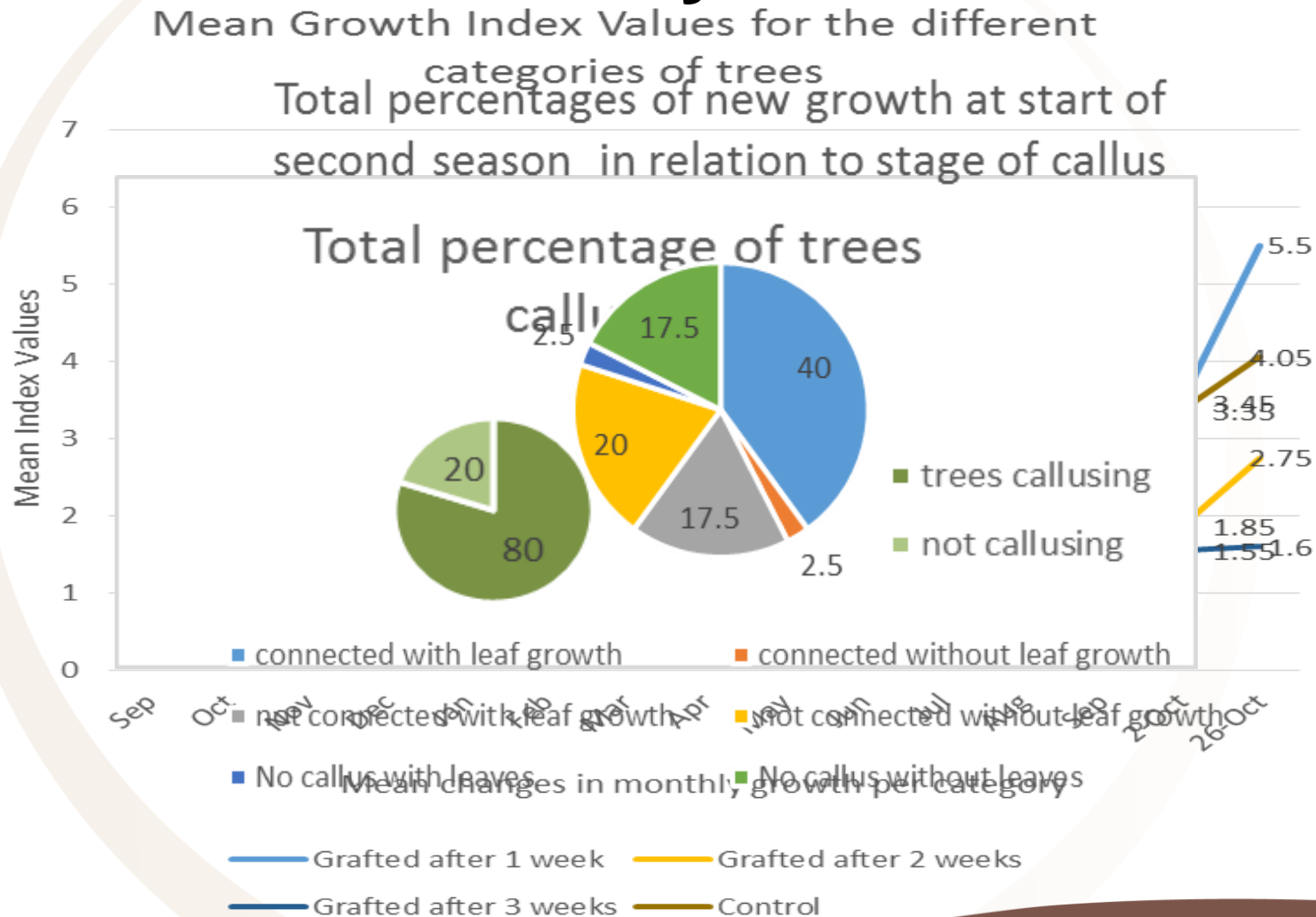


BARK SAMPLING AND ANALYSIS

- 9 sampling dates
- two-monthly
- Total number of samples = 392
- Analysis = Plant metabolomics
 - * Untargeted =
All metabolites
 - * Targeted =
Carbohydrates
Auxin IAA



Results from Study on *Acacia karroo*



Photos of *Acacia karroo*

Taken 1 February 2015



Grafted 1 week after girdling



Grafted 2 weeks after girdling



Grafted 3 weeks after girdling



← Control Trees →



Significance of the Study

- **Save individual girdled trees**
- **Maintain tree species diversity, genetic diversity and biodiversity**
- **Prevent extinctions**
- **Maintain plant community relationships**
- **Management plans – complimentary to harvesting management and education – not alternative!**
- **Expanded to include other valuable medicinal tree species e.g. *Warburgia salutaris* – guarded by people!!**

THANK YOU



Learn without limits.