Choice of harvesting system: Matching prescriptions to species

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Introduction

- Large variety of products harvested from natural forest and woodlands (Timber and NTFP)
- Generic process for development of prescriptions for sustainable harvesting
  - Resource inventories
  - Rate of renewal (growth or production rate)
- Bark harvesting
  - Tree response to bark stripping

Tree response to bark stripping

- No wound closure
- Wound closure through edge growth
- Wound closure through sheet growth
- Wound closure through sheet and edge growth
- Varying degree of rate of wound closure

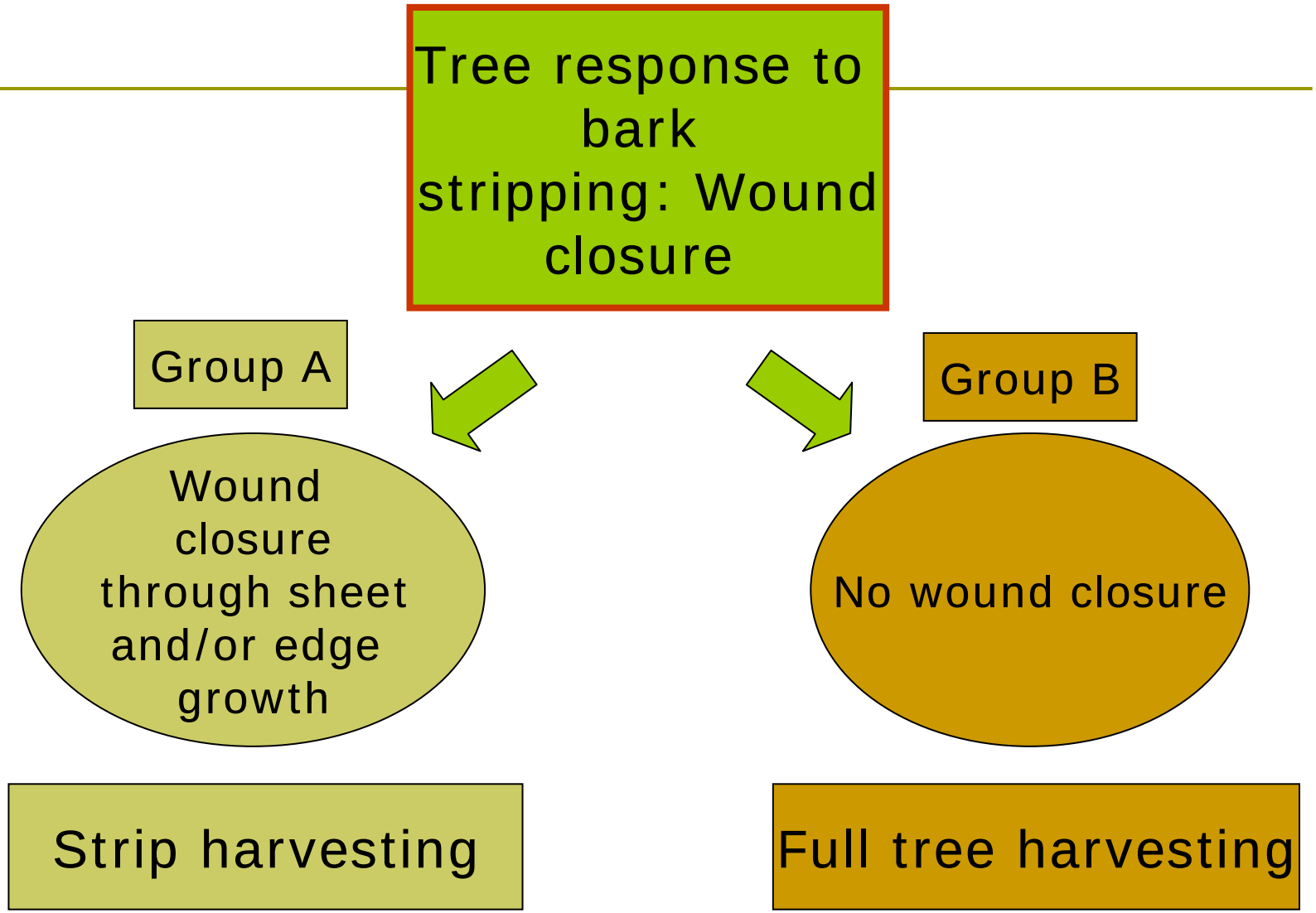
- Varying degrees of susceptibility to fungal and insect attack

Approach with development of harvest system

- Group species together based on their response to bark stripping
- Decision tree
- Develop harvest systems for species groups

- Harvest systems
  - Strip harvesting
  - Full tree harvesting

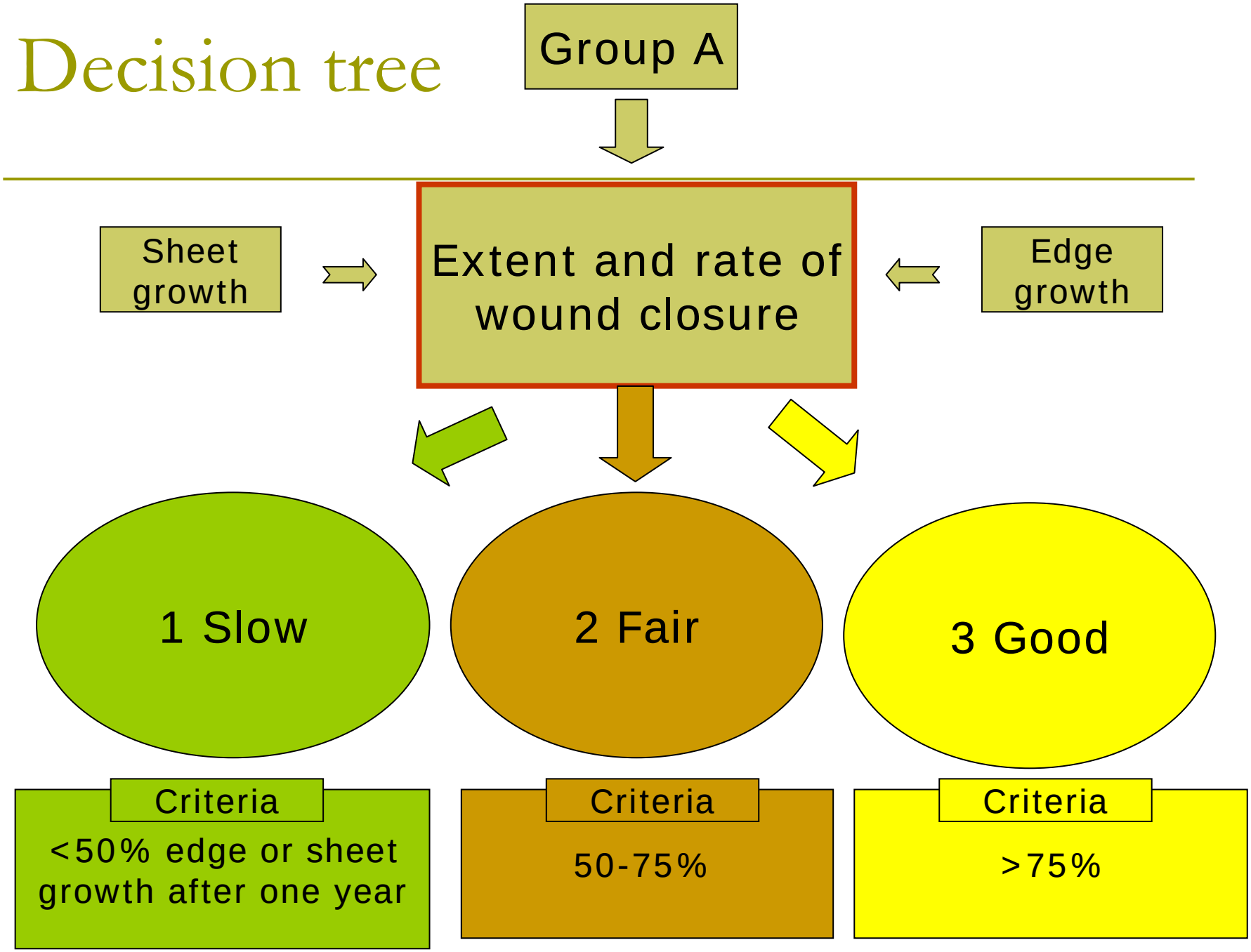
Decision tree



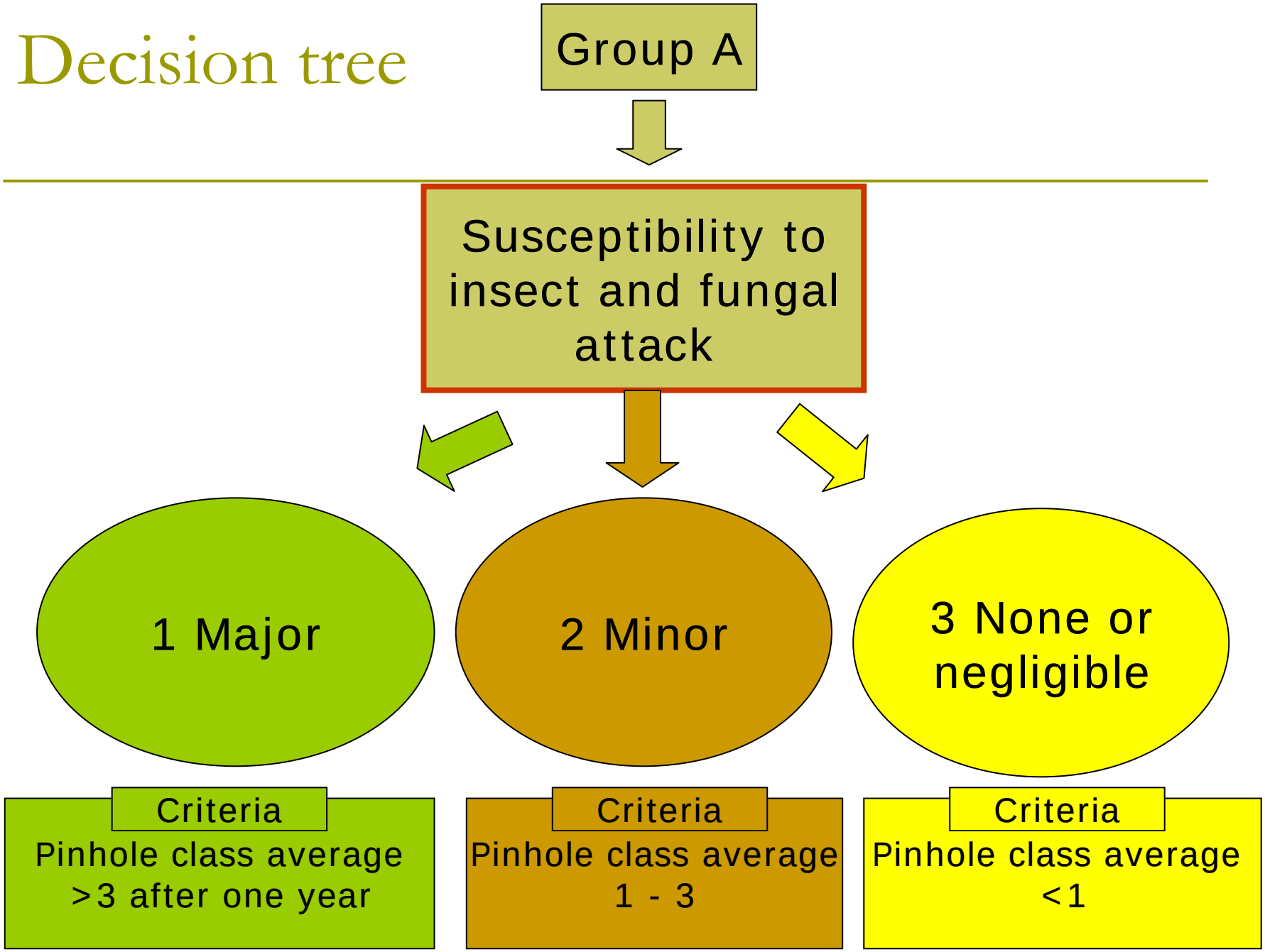
Group A. Strip harvesting

- Group further based on:
  - Extent and rate of wound closure
  - Susceptibility to insect and fungal attack

Decision tree



Decision tree



Selection of harvest system

- Harvest system would largely depend on:
  - Wound closure after bark stripping
  - Susceptibility to insect and fungal attack
- Combine the above in the allocation criteria
- Practical to apply

Selection of harvest system

		Insect and Fungal attack		
		1 Major	2 Minor	3 None
Wound closure	None	Full tree harvesting	Full tree harvesting	Full tree harvesting
	1 Slow	Full tree harvesting	Full tree harvesting	Strip harvesting
	2 Fair	Full tree harvesting	Strip harvesting	Strip harvesting
	3 Good	Strip harvesting	Strip harvesting	Strip harvesting

Selection of harvest system

		Insect and Fungal attack		
		1 Major	2 Minor	3 None
Wound closure	None	Full tree harvesting	Full tree harvesting	Full tree harvesting
	1 Slow	Full tree harvesting	Full tree harvesting	Strip harvesting
	2 Fair	Full tree harvesting	Strip harvesting	Strip harvesting
	3 Good	Strip harvesting	Strip harvesting	Strip harvesting

Border-line species

- Factors to be taken into consideration with final allocation to harvest system

Bark lift
Agony shoots
Excretions
Other damage
Tree condition

Allocation of species: Southern Cape Forest

		Insect and/or Fungal damage		
		1 Major	2 Minor	3 None
Wound closure	None	*R. melanophloeos*		
	1 Slow		*R. chirindensis*	
	2 Fair		*I. mitis*	
	3 Good			*O. bullata* *P. africana*

Harvest prescriptions for strip harvesting

- Strip width and length
- Harvest rotation
- Number of strips
- Side of tree
- Harvest season
- Tree diameter
- Tree condition
- Percentage of growing stock
- Harvest method

No fixed way of formulating prescriptions

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Strip width and length

- Strip length - Determinants
  - Length of clear bole
  - Extent of taper
- Strip width – Determinants
  - Rate of wound closure through edge or sheet growth
  - Sheet growth: rate of bark thickening
  - Susceptibility to fungal/insect attack
- Number of strips
  - Tree diameter

Strip width and length Cont.

- Recommendation for most species
  - 2m length strips; 0.5 m from stem base
  - 5 or 10 cm strips
  - 1 or 2 strips
  - For **sheet growth**, strip width could also be proportional to the diameter of the tree

Harvest rotation

- Determinants
  - Rate of wound closure through edge and sheet growth
  - Susceptibility to fungal/insect attack
- Trade-off
  - The wider the strip width, the longer the harvest rotation and *vice versa*
- Insect and fungal attack
  - Major: Max 2 years rotation (strip width should allow for wound closure within two years)
  - Minor: > 2 years

Harvest rotation Cont.

- Two options
  - Second harvest only once total wound closure of 1st harvest have occurred
  - Second harvest while strip of 1st harvest is still only partly closed (larger trees)
- Rotation of strips on bole
  - One strip: East - West – South – (North?)
  - Two strip: East/West – South/North

Other prescriptions

- Tree diameter
  - Canopy species: Minimum DBH 20 cm
  - Sub-canopy species: Minimum DBH 10 cm
- Tree condition
  - Relatively healthy trees
  - Trees of advanced stage of crown die-back – full tree harvesting

Other prescriptions Cont.

- Percentage of growing stock of target species - Depends on:
  - Resource availability and demand (bigger area, smaller percentage *versus* smaller area, larger percentage)
  - Uncertainties around wound closure
- Harvest season
  - Differential response to bark stripping
  - Accommodate in harvest system, where possible

Harvest prescriptions: Strip width (edge growth), harvest percent and rotation

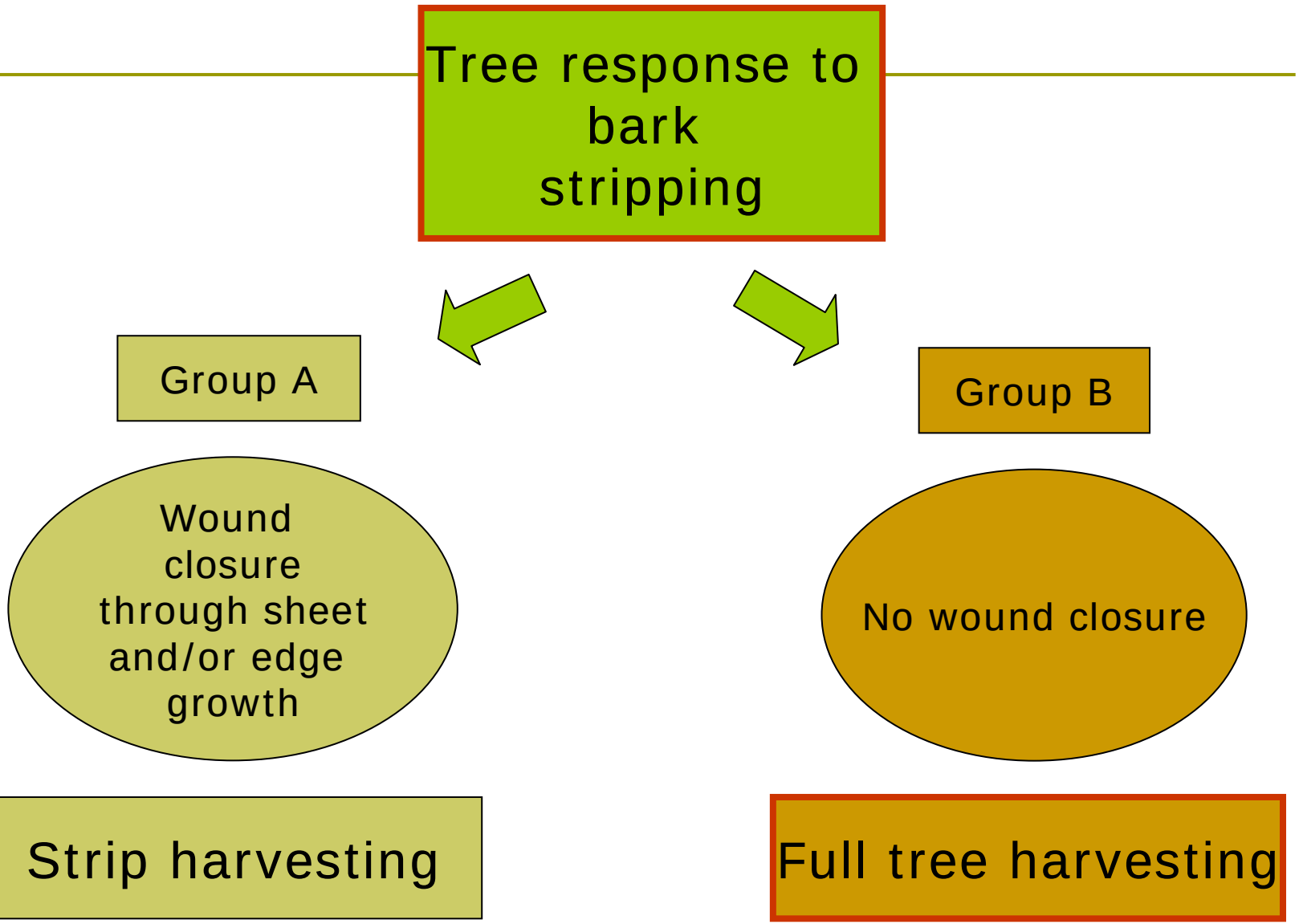
		Insect and/or Fungal damage		
		1 Major	2 Minor	3 None
Wound closure	None	Full tree harvesting		
	1 Slow			5cm strip 33% of stock
	2 Fair		5cm strip 33% of stock	10 cm strip 50% of stock
	3 Good	5cm strip 33% of stock	10 cm strip 50% of stock	10 cm strip 66% of stock

- Harvest rotation should allow for wound closure
- Strip width for sheet growth could be proportional to tree diameter

Harvest method

- Lifting of remaining bark from the wound around the wound edge occurs with some species
- Bark lift causes:
  - Wound widening
  - Delayed edge development
- Harvest measures
  - Use axe with thin blade or similar tool
  - Insert axe at angle
  - Remove narrow strips instead of whole strip all at once

Decision tree



Full tree harvesting

- No or little wound closure
- Sustainable felling of trees for bark harvesting
- Harvesting of bark from stem and branches
- Timber yield regulation system
  - Growing stock inventory
  - Rate of turnover (ingrowth and mortality)
  - Calculation of harvest numbers
  - Criteria for selection of harvestable trees

Full tree harvesting Cont.

- Could also be applied to species identified for strip harvesting, especially commercial bark harvesting

- Timber could be used as by-product e.g. for carving

Adaptive management

- Forest ecosystems are complex difficult to predict response to management actions
- Long-term impact of bark harvesting on tree survival not yet known
- Monitoring of harvest impact and tree response to bark stripping
- Refine harvest prescriptions as part of an adaptive management approach

- Also for species for which no research results are available: use available knowledge

Alternative resources / Management options

- Coppice management (for species with active coppice regrowth)
- Establishment of forest stands for bark harvesting (on forest edge, in forest clearings)
- Cultivation for leaf harvesting (where active compounds are also present in the leaves)
- Integrated resources use (e.g. bark as by-product of timber harvesting)
- In consultation with stakeholders