Harvesting-silviculture interface with reference to manual and mechanised operations

Big opportunities

Diana Rietz and Simon Ackerman

Harvesting-Silviculture Interface

- Closely related and affected by one another
- Technological advances have occurred in both sets of operations in SA

Opens up opportunities for improved efficiencies

1. Define ~~challenges~~ opportunities
2. Determine causes
3. Consider solutions:

   Short- (immediate), medium- and long-term

Challenges:

Challenges: Silviculture perspective due to harvesting:

- Residues and timber waste
  - Quantity – fire hazard
  - Distribution – physical impediment and compartment access
- Stump height
  - Mechanised ops: physical impediment and maintenance
- Stump coppice-ability
  - Mechanised ops stump damage
- Rutting and compaction
- Compartment accessibility
  - Steep compartments mech harvested

Challenges: Harvesting perspective due to silviculture:

- Orientation and “straightness” of tree lines
  - Mechanised ops: contour vs up-down slope
    straightness of rows
- Vegetation management/weeding
  - Mainly pre-harvest of sawtimber stands
- Spacing
  - Mechanised ops accessibility to compartment
- Non-uniform and coppiced stands
  - Efficiency of mechanised ops

Why do these challenges/opportunities exist?

Possible reasons:

- Management structures and focus
  - Separate management of harvesting and silviculture
  - Drive to lower costs within each operational area
- Outsourcing/contracting of operations
- Increased mechanisation of operations
  - Labour – ergonomics
  - Cost effective
  - Technological advances
  - Lack of flexibility

Current responses to the challenges

Silv

- ber waste **- Burned**
- **ng/Cut stumps low**
- Stum **coppicing**
- Rutting an **through**

Harvesting:

- Orientation and "straigh **stigated**
- Vegetation management **- C**
- Spacing **- Investigated**
- Non-uniform and coppice stands **- Limit**

Are these long-term solutions?

Are these solutions optimal?

How can we create greater synergy between harvesting and silviculture?

By adjusting the current “modus operandi”:

- Variety of operations employed within the industry
- Economics of any change in operations must be economically viable
- The implications of ***any*** change must be understood as fully as possible prior to embarking on that change

Other potential solutions

Harvesting opportunities:

Residues and utilisable timber waste.

Can we:

- Mulch/coarse mulch?
- Bio-energy production? (portable fast pyrolysis)
- Community collection of timber and large branches?
- Longer log lengths or optimised lengths?
- Better monitor and promote timber extraction?
- Own operations?
- Alteration of operations?

Harvesting opportunities:

Stumps

- Adapt operation/machinery to cut stumps lower?
- Perform pre-harvest under canopy burn?

Stump coppice-ability

- Machinery selection?
- Row width?

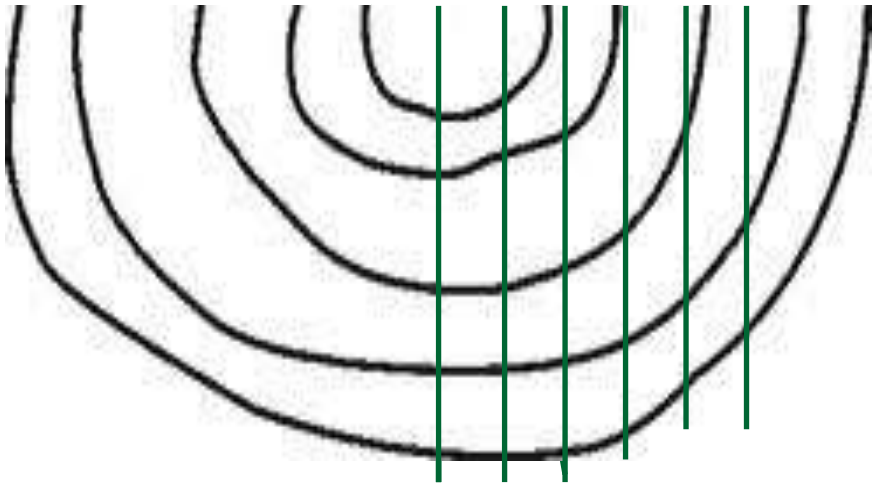
Rutting and compaction

- Timing of operations?
- Matching machinery to sites?

Silviculture opportunities:

Orientation and straightness of tree lines

- Improved planning/company policy?
- Implications on
  - Stand productivity and mechanised operations
  - Erosion and vegetation management



Silviculture opportunities:

Pre-harvest vegetation management (sawtimber)

- Leave residues from thinnings in sunlit areas?
- Keep forest floor intact (reduce undercanopy burning)?

Spacing (row widths)

- Optimised for operations?
- Implications for stand productivity and vegetation management?

Non-uniform and coppice stands

- Ensure better silviculture?

Silviculture (mechanised):

Seedling specifications

- Seedling size – optimal?
  - Number of seedlings per tray
  - Biodegradable inserts
  - Nursery requirements
  - Tray transport
- Seedlings vs cuttings?
- Diseases from damage in planting

Pit size and quality specifications

- Adjustment to hydrogel application

Residues and timber waste mgt

- Machinery adaptation?

What are the common denominators in these potential solutions?

1. Research
    - Future research priorities – integration of mechanised operations
    - Utilise current knowledge (mainly around manual operations)

2. Planning and communication

Planning: Determine the links between components of the *entire* supply chain

Five main components:

1. Research and development - Site-species matching, mill requirements etc.

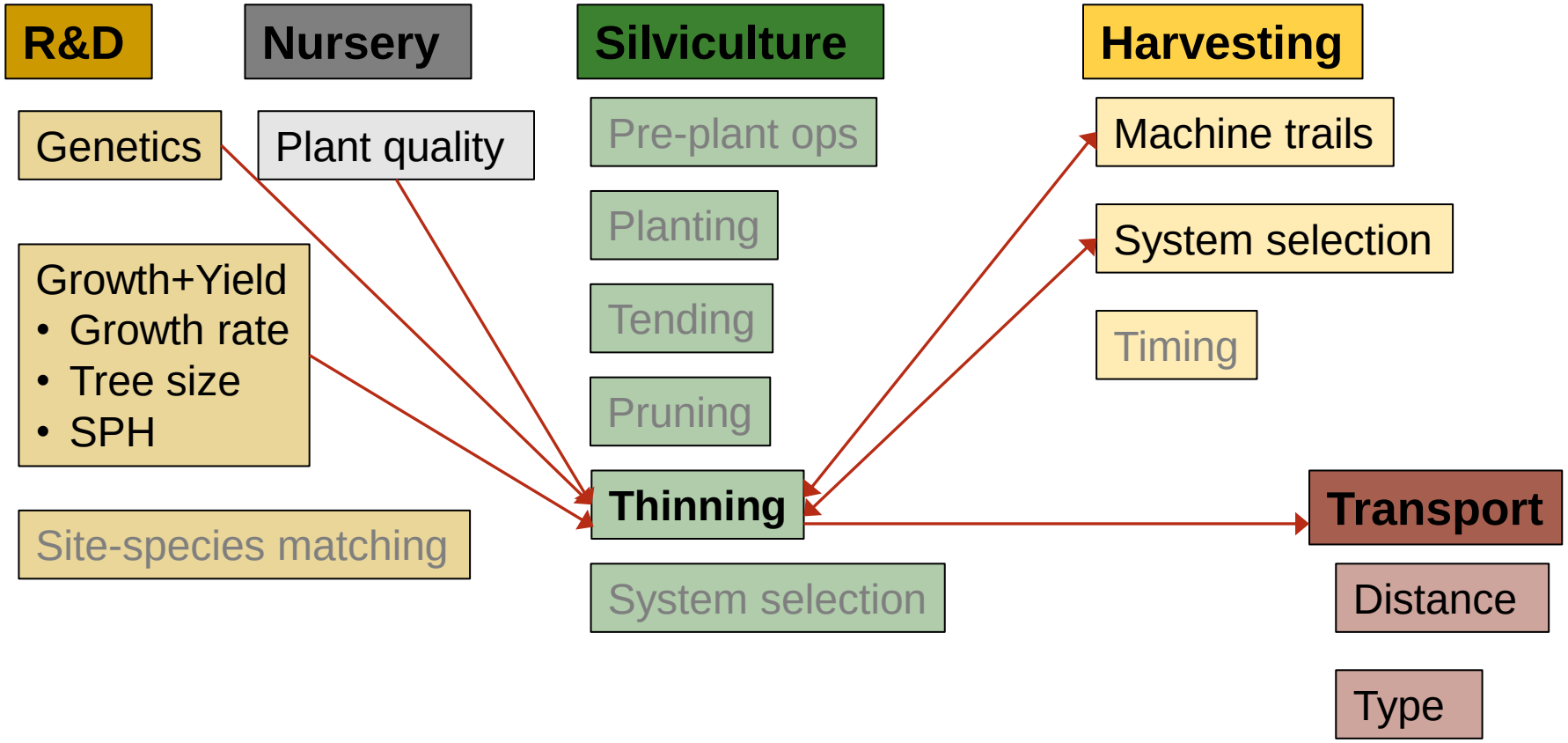
Full supply chain planning required

4. Harvesting - System selection, site conditions etc.

5. Transport – Distance to mill, transport type etc.

Many components affect one another

Planning example:



Revisit how we plan and test implications

Conclusions

- Mechanised operations will become more prevalent
- Need to adapt/invent new systems originally designed for manual operations to that of mechanised systems
- Communicate
- Recognise that opportunities exist to reduce the delivered cost of wood – costs/tonne – implications for global competitiveness
- Ensure future wood supply by realising implications of changes on site productivity

ICFR/FESA collaboration:

- Industry survey complete – Publication in process
- Further interaction with key members in all companies and other researchers to determine research priorities
- Initiate research
- Decision support tool




Acknowledgements:

- Many company people

MERENSKY

nct ESTABLISHED 1949

sappi

Komatiland forests

YORK TIMBERS

TWK agri

mondi

- Fellow researchers at the ICFR