Mechanised silviculture – Goal/focus of R&D according to Finnish forest industry

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Silvicultural technology – III Workshop
on innovative management for
target-oriented silviculture

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Vision: Efficient Wood Supply 2025

”Focus on the efficiency and strategic planning of wood supply improves the competitiveness of the forest industry and guarantees its growth and regeneration potential.”

Development goal 2025

Wood supply produce added value to the value chain while being 30% more cost-efficient than today.

Source: Efficient Wood Supply 2025, Metsäteho 2015
R&D goals

- More efficient timber logistics
- Structure and leadership reforms
- Profitable wood production
- Well-functioning forest product market
Efficient Wood Supply 2025 vision, targets and R&D focus:

**VISION**
Focus on the efficiency and strategic planning of wood supply improves the competitiveness of the forest industry and guarantees its growth and regeneration potential.

**Targets**
- Structure and leadership reforms
- Digitalisation
- Profitable wood production
- Well-functioning forest product market
- More efficient timber logistics

**R&D focus areas**
- Increasing wood production
- Growing stock and condition information
- Standards
- Online service portal
- Capital efficiency
- Entrepreneurship
- Value chains
- Cost-efficient forest management
- Big Data
- Electronic learning environments
- Wood supply to market
- Raw material efficiency and allocation
- Logging and transport control
- Energy wood production chains
- Mechanisation of forest management
- Decision supporting systems
- Automation and robotics
- Pricing and measurement methods
- Logistics solutions
- Logging and transport technology
- Transportation infrastructure

**Consumer demand and sustainability management**
Research / R&D topics – planting and seeding

• Continuously operating planting machine
• Promoting the use of existing mechanised planting machines
  – mechanised planter website
• Soil preparation device for mechanised seeding

• Methods to define site conditions / Utilisation of Big Data
  – soil type, site fertility class, stoniness
  – sensor or camera technology
• Development and harmonisation of quality management and self control methods
Research / R&D topics – young stand management

• Mechanical methods to prevent hardwood sprouting in early cleaning
  – effectiveness of uprooting and brushing method

• Biocontrol of sprouting in early cleaning
  – Chondrostereum purpureum (purppuranahakka)

• Methods to improve productivity through sensor technology and automation
  – real-time and robust sensor technology which can be used to locate and visualize trees
    for operator as well as move the boom and the processing head

• Utilisation of Big Data in mechanised young stand management

• Cost-effectiveness of mechanised pre clearing
Mechanised planter website
Pentin Paja’s patch scarifier for seeding
Autonomous planting spot detection

- Machine vision algorithm is using measured 3D model of the ground to determine best planting spot autonomously
  - The algorithm is taught using similar data and can be re-taught to new environment

Source: Aalto University & Luke

Precision 94.8 %, recall 98.0 %
Quality management / self control in mounding

Real-time documentation system
- density of mounds / plants

Source: Risutec
Low-cost Mobile 3D Scanning in Forest

Source: Heikki Hyyti, Aalto University
Plant detection and automatic cleaning

Plant Detection and Automatic Point Cleaning

Department of Automation and Systems Technology

NeoSilviX
New devices

Cutlink (Vallius Forestry Ltd)

Ekopete
Mechanised pre clearing – some alternatives

MenSe RT7 add-on (MenSe Ltd)

Energy harvester bar (Iggesund Forest Ltd)
Key factors when pursuing productivity and cost competitiveness leap in silvicultural operations

- Continuously operating planting machine
- One treatment in early stage (early cleaning)
- Mechanical or biological method to prevent hardwood sprouting
- Real-time sensor technology, tutoring systems and automation
- Utilisation of Big Data
Thank you!