Mechanized tree planting in Finland

Tiina Laine¹, Kalle Kärhä², Antti Hynönen³

¹ Natural Resources Institute Finland
² Stora Enso Wood Supply Finland
³ University of Eastern Finland
Background

- Last survey about mechanized planting activities was conducted by Metsäteho Ltd on 2003
- On 2014, the information concerning 2013 was updated
- All businesses providing mechanized tree-planting service were interviewed
  - describe the equipment and activities
  - identify critical success factors
  - suggest areas for improvement
Metsätehon raportti 233
22.9.2014

Koneellinen metsänistetus ja sen tehostaminen Suomessa

Kalle Kärhä
Antti Hynönen
Tiina Laine
Markus Strandström
Kyösti Sipilä
Teijo Palander
Pekka T. Rajala

ISSN 1796-2374 (Verkkojulkaisu)

METSÄTEHO OY
Vermisakatu 4
01300 Vantaa

www.metsateho.fi
In 2013…

• …31 planting machines were operated by 22 businesses (fourteen had a single planting machine, seven had two, and one had three)
  – 18 Bracke P11.a
  – 11 M-Planter
  – 2 Risutec
• … approximately 4.7 million seedlings were planted mechanically on 2,663 hectares.
• …most planting devices were mounted on the boom of 14–21-ton excavators, two were harvester-based.
Planting season on average

- 19.9 weeks i.e. 4.9 months
  - starting at the beginning of May and ended late September or the beginning of October
- Stoppages 1.2 weeks during the planting season
- Other excavator works (i.e. soil preparation, ditching and stump lifting) 0.8 weeks
- Other work for base machines for 2.9 months outside the planting season
Performance

• Each machine planted an average of 151,242 seedlings on 86 ha (45,000–320,000 seedlings/machine)
• Worksites were on average 4.7 hectares and located <61.5 kilometers from the depot.
• 90% of the planted seedlings were Norway spruce (Picea abies (L.) Karst.) and the rest were Scots pine (Pinus sylvestris L.)
• Average productivity was 1,614 seedlings and 0.92 ha per work day
Performance

• 1-3 clients (1.7 on average)
  – 86% large silviculture and forest industry enterprises
  – 8% local forest management associations
  – 6% non-industrial private forest owners
• Less than half of planting machines worked in two shifts and one third in one work shift
## 2013 vs. 2003

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>2003</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of planting devices</td>
<td>pcs</td>
<td>16</td>
<td>31</td>
</tr>
<tr>
<td>Number of businesses</td>
<td>pcs</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>Share of mechanized planting</td>
<td>%</td>
<td>1.6</td>
<td>3.5</td>
</tr>
<tr>
<td>Planting machines per business</td>
<td>pcs</td>
<td>1.14</td>
<td>1.41</td>
</tr>
<tr>
<td>Amount of work</td>
<td>ha</td>
<td>1,420</td>
<td>2,663</td>
</tr>
<tr>
<td>Planted seedlings</td>
<td>million pcs</td>
<td>2.5</td>
<td>4.7</td>
</tr>
<tr>
<td>Relocation distance</td>
<td>km</td>
<td>20–30</td>
<td>22.2</td>
</tr>
</tbody>
</table>
Critical success factors

- Operator skill
  - lack of professional operator
- Work quality
- Worksite selection
  - worksites were stony and slash or stumps have not been removed
- Sufficient amount of work during the planting season
  - cost-efficiency
Future

• Higher utilization rate
  – improves cost-competitiveness
• Improved working conditions
  – no stony sites and areas with slash and stumps removed
• Introduction to non-industrial private forest owners
  – education, marketing activities and field demonstrations
Thank you!

tiina.laine@luke.fi