Operational short rotation woody crop plantations: manual or mechanised harvesting?

Stefan Vanbeveren

Coppice forests – past, present and future

10 April 2015
Overview

- The POPFULL project
- Harvesting
  - SRC
  - POPFULL
- Conclusions
The POPFULL project

A short-rotation coppice culture

- 14.5 ha planted on 18.4 ha
- 12 *Populus* & 3 *Salix* genotypes
- No irrigation, no fertilisation
The POPFULL project

A short-rotation coppice culture

- 8000 plants ha\(^{-1}\) → 100,000 plants
- 2x 2 year rotations
- Double-row planting scheme

![Graph showing biomass productivity from 2010 to 2013 with 4 year average]

Biomass productivity (ton ha\(^{-1}\) yr\(^{-1}\))

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>4 yr average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ton ha(^{-1}) yr(^{-1})</td>
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<tr>
<td>2010</td>
<td>2</td>
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</tr>
<tr>
<td>2011</td>
<td>6</td>
<td></td>
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</tr>
<tr>
<td>2012</td>
<td>10</td>
<td></td>
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<tr>
<td>2013</td>
<td>14</td>
<td></td>
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<tr>
<td>4 yr average</td>
<td>9</td>
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The POPFULL project

The three primary objectives

1. A complete greenhouse gas balance
2. A complete energy balance
3. A complete economic balance
Harvesting

Short-rotation coppice cultures in general

Harvest

- Cut-and-chip

Storage

- Wet chips

Cut-and-store

- Wet stems

Cut-and-store

- Dry Chips

Chipping
Harvesting

POPFULL at the end of the second 2 years rotation

- 10.07 ± 5.15 shoots per stump
- Diameter 18.59 ± 14.50 mm

13.28 ha mechanised (Stemster MKIII)

1.36 ha manual (chainsaw)
Harvesting

POPFULL

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<tr>
<th></th>
<th>Mechanised (Stemster)</th>
<th>Manual (chainsaw)</th>
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</thead>
<tbody>
<tr>
<td>Scheduled machine hours</td>
<td><img src="image1" alt="Pie Chart" /></td>
<td><img src="image2" alt="Pie Chart" /></td>
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<tr>
<td>6%</td>
<td>76%</td>
<td>3%</td>
</tr>
<tr>
<td>6%</td>
<td>12%</td>
<td>3%</td>
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<tr>
<td>48%</td>
<td>27%</td>
<td>62%</td>
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</tbody>
</table>

Legend:
- pmh
- maintenance
- (dis)assembly
- other

Legend for productive machine hours:
- coppicing
- turning
- offloading
Harvesting POPFULL
Harvesting

POPFULL
Conclusions

- POPFULL more expensive than literature averages

- € cut-and-chip harvesting

  - €€ mechanised cut-and-store harvesting

  - €€€ manual cut-and-store harvesting

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<thead>
<tr>
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<th>Cost per tonne (€ t(^{-1}))</th>
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<tr>
<td></td>
<td>POPFULL</td>
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<tr>
<td>Cut-and-store – manual</td>
<td>426</td>
</tr>
<tr>
<td>Cut-and-store – mechanised</td>
<td>94</td>
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<td>Cut-and-chip</td>
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</table>
Acknowledgements

- Funding agencies:
  - ERC - FP7
  - Flemish Government - Hercules Foundation
  - University of Antwerp - Methusaleem Program

- COST action FP1301: EUROCOPPICE

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  - Dr. Janine Schweier
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More information

- Published as
  Vanbeveren et al., Biomass and Bioenergy 72, 8-18 (2015)