Silvicultural principles for growing valuable broadleaved species

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To start with ..........

*birchbeer*
My presentation

1 Intro: aim of presentation, what are we talking about? (species, areas)
2 Basic needs for growing valuable timber
3 Stand management and important principles

1 Aim; what are we talking about?
- Aim
- Species: *Fraxinus exc.*., *Acer ps.*, *Prunus avium*, *Juglans regia*, *Tilia sp.*, *Sorbus torminalis*, *Betula sp.*, *Alnus glut.*
- Areas: low % of European forest area
- High (potential) economic value
Species characteristics

- produce quality timber
- need good sites
- height growth: rapid to 10-20 yr
- development of heavy branches in free growth

Growing quality timber

- General goal: as fast as possible, as much as possible valuable timber per ha
- Definition of valuable stems:
  - straight
  - knotfree
  - faultfree
  - diameters >30 cm
  - lengths .. X 250 cm
Like these

2 Basic needs for growing quality timber

- suitable site
- right phenotypical characteristics
- adequate stand management
  (establishment/regeneration method, cleaning, thinning, pruning)
Suitable site

- site characteristics which allows good growth:
  - high nutrient level
  - continuously moisture
  - no stagnant water (except Alnus)

Right phenotypical characteristics

- good growth (height and diameter)
- straight stem
- small (right angled) branches
Adequate stand management

Stand management = backwards thinking

Forest development stages
# Silvicultural Goals and Measures

<table>
<thead>
<tr>
<th>Development stage</th>
<th>Silvicultural goals</th>
<th>Silvicultural measures</th>
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<tbody>
<tr>
<td>1. Seedling/establishment</td>
<td>Sufficient number of young trees with good shape and growth</td>
<td>Choice of provenance, Site preparation, Stocking (number of plants per ha), Mixture of species, Game protection, Fertilization, Weed control, Pest control, Drainage</td>
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<tr>
<td></td>
<td>Branch free bole of (potential) final crop trees</td>
<td>Pruning, Removal of &quot;wolf&quot; trees, Pre-commercial thinning</td>
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<tr>
<td>2. Young stage</td>
<td>Healthy stand, Pest control, Final crop trees, Selection of final crop trees</td>
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<td></td>
<td>Optimal diameter growth of final crop trees, No dieback of lower branches</td>
<td>Thinning,</td>
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<tr>
<td>3. Thinning stage</td>
<td>Usable stems (diameter, quality)</td>
<td>Final harvesting, Choice of remaining seed trees, Fertilization, Site preparation, Weed control, Pest control</td>
</tr>
<tr>
<td>4. Adult/regeneration stage</td>
<td>Species composition of the next generation</td>
<td></td>
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Two ways

**Tradition**
- high stem number
- long knotfree bole
- long rotation

**Other way**
- low stem number
- shorter knotfree bole
- shorter rotation

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Two ways

- Traditional
- Other
Management of knotfree bole and crown length

Crownbase?
Pruning

- When enough density natural pruning will do (birch, black alder, ash, Acer)
- When heavy thinning starts early or trees are planted very wide, ARTIFICIAL PRUNING is needed and HAS TO START EARLY (branches max 3 cm; birch 2 cm)
Pruning IN TIME!

Management of diameter
Mean diam of future crop trees of ash

- 10000 trees per ha
- 400 trees per ha

Graph showing the increase in mean diameter over time (T yr) for two different tree densities.
Advantages (+) and disadvantages (-) of narrow and wide spacing

<table>
<thead>
<tr>
<th></th>
<th>Narrow spacing</th>
<th>Wide spacing</th>
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<tbody>
<tr>
<td>Costs</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Closing of canopy</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Necessity of thinning</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Necessity of pruning</td>
<td>+</td>
<td>-</td>
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<tr>
<td>Diameter increment</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Vitality/resistance against diseases and pests</td>
<td>-</td>
<td>+</td>
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<tr>
<td>Chances for undergrowth, underplanting</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>
Important other aspects

Blackheart (Ash) >>> T < 60 yr
Heartrot (Alder) >>> T < 60 yr
Blackspots (Birch) >>> mix?