Hybrid aspen and Poplar – Breeding activities at Skogforsk

Skogforsk, Lars-Göran Stener
Skogforsk in brief

The Forestry Research Institute of Sweden
Forestry and Government in collaboration
Applied research and development
Over 100 employees, in three locations
Research areas:
- Forest Production
- Wood Supply
Research organisationen -2016

Two research areas. Six programmes.

<table>
<thead>
<tr>
<th>Forest Production</th>
<th>Wood Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marie Larsson-Stern</td>
<td>Magnus Thor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tree Breeding, North</th>
<th>Tree Breeding, South</th>
<th>Silviculture &amp; Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bengt Andersson Gull</td>
<td>Bo Karlsson</td>
<td>Isabelle Bergkvist</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operations and Products</th>
<th>Forest Energy</th>
<th>Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolf Björheden</td>
<td>Maria Iwarsson Wide</td>
<td>Gert Andersson</td>
</tr>
</tbody>
</table>
Funding

Budget 2015: SEK 169 million

Framework grants

Members

Government

Fixed fees

Variable fees

Funds

Commissions

Other forestry enterprises

Communication

Miscellaneous
Long term breeding
• Norway Spruce (*Picea abies*)
• Scots pine (*Pinus sylvestris*)
• Lodgepole pine (*Pinus contorta*)
• Silver birch (*Betula pendula*)

Short term breeding
• Larch (*L. decidua x L. kaempefri, L. sibirica*)
• Sitka spruce (*Picea sitchensis*)
• Douglas fir (*Pseudotsuga menziesii*)
• Hybrid aspen (*P. tremula x P. tremuloides*)
• Poppel (*Poplar sp*)
• Alder (*Alnus glutinosa*)
• Oak (*Quercus robur*)
• Beech (*Fagus sylvatica*)
• Ash (*Fraxinus excelsior*)
• Wild cherry (*Prunus avium*)
• Linden (*Tilia cordata*)
Breeding objective traits

Forest products today and in the future?

Basic traits
• Survival
• Vitality (climatic adaptation, resistance to pathogens
• Growth
• Stem quality (straightness, branchiness)

New traits
• Wood properties (mechanical, chemical)
Hybrid aspen clonal tests from 1986-2013

- Today’s material is based on the work in the 1940’s and 1950’s

- 280 plus trees phenotypically selected in stands/trials in southern Sweden

- Genotypic selection of the 15 ”best”, for commercial use in s. Sweden. Only 4-8 are propagated.

- An additional selection in year 2013 of another 10 clones
Hybrid aspen, Mean yield in clonal tests

Southern Sweden
Fertile soils
Fencing!
Soil preparation
The best 20 clones

25 m³/ha, year (stem wood) after 20-25 years
Total biomass
10 ton DM/ha, year
Poplars, 1990-2010

- Material from colleagues in Belgium, Holland, France, USA, Canada ...
  *P. trichocarpa, P. maximowiczii (P. nigra, P. deltoides)* and their hybrids.

- Not adapted to our climate

- Only one clone (OP42) used until year 2010

- Selection of 15 well growing clones out of 140 tested clones
Resistance test Poplar
- Leaf rust
- Bacteria canker

Selected clones for s Swe
New promising clones for S Sw
New promising clones for N Sw
Resistance test – Stem canker
Hybrid aspen
Clonal tests from 2010-2012.

Few selected clones and only for s. Swe. There is a need of more!

10 new clonal tests in Swe (and 3 in Denm): Forest land and agricultural land within six climatic regions

Measured at age 4 and now this year (age 7)
New clonal trials year 2015
including among others
- Hasp
  - New Swe northern crossings
  - German commercial clones
- Poplar
  - German commercial clones
  - Br Col clones
  - Italian clones
Short Rotation Forestry (SRF) trial in cooperation with other EU-contries

15 poplar clones from Europe

Each clone: 4x10 plots, 3 repl

Spacing 1 x 2.5 m

Planted in spring 2014

To be harvested at age 6

<table>
<thead>
<tr>
<th>Country</th>
<th>Name/Clone</th>
<th>No of plots</th>
<th>Surv_3 %</th>
<th>Tu</th>
<th>Hght_3 %</th>
<th>Tu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>S23K9040089</td>
<td>3</td>
<td>100</td>
<td>A</td>
<td>123</td>
<td>A</td>
</tr>
<tr>
<td>Sweden</td>
<td>S21K766005</td>
<td>3</td>
<td>96</td>
<td>AB</td>
<td>121</td>
<td>A</td>
</tr>
<tr>
<td>Sweden</td>
<td>OP42</td>
<td>3</td>
<td>96</td>
<td>AB</td>
<td>113</td>
<td>AB</td>
</tr>
<tr>
<td>Belgium</td>
<td>Skado</td>
<td>3</td>
<td>65</td>
<td>ABC</td>
<td>111</td>
<td>AB</td>
</tr>
<tr>
<td>Germany</td>
<td>NE42</td>
<td>3</td>
<td>92</td>
<td>ABC</td>
<td>105</td>
<td>AB</td>
</tr>
<tr>
<td>Sweden</td>
<td>S23K9040086</td>
<td>3</td>
<td>94</td>
<td>AB</td>
<td>105</td>
<td>AB</td>
</tr>
<tr>
<td>Belgium</td>
<td>Grimminge</td>
<td>3</td>
<td>69</td>
<td>ABC</td>
<td>104</td>
<td>ABC</td>
</tr>
<tr>
<td>Hungary</td>
<td>Sv490</td>
<td>3</td>
<td>60</td>
<td>BC</td>
<td>102</td>
<td>ABC</td>
</tr>
<tr>
<td>Germany</td>
<td>Koreana</td>
<td>3</td>
<td>85</td>
<td>ABC</td>
<td>100</td>
<td>ABC</td>
</tr>
<tr>
<td>Germany</td>
<td>Max4</td>
<td>3</td>
<td>85</td>
<td>ABC</td>
<td>99</td>
<td>ABC</td>
</tr>
<tr>
<td>Italy</td>
<td>AF34</td>
<td>2</td>
<td>19</td>
<td>E</td>
<td>97</td>
<td>ABC</td>
</tr>
<tr>
<td>Italy</td>
<td>AF8</td>
<td>3</td>
<td>81</td>
<td>ABC</td>
<td>95</td>
<td>ABC</td>
</tr>
<tr>
<td>Italy</td>
<td>Brenta</td>
<td>2</td>
<td>56</td>
<td>CD</td>
<td>76</td>
<td>BC</td>
</tr>
<tr>
<td>Italy</td>
<td>Baldo</td>
<td>3</td>
<td>23</td>
<td>DE</td>
<td>74</td>
<td>BC</td>
</tr>
<tr>
<td>Germany</td>
<td>Matrix21</td>
<td>3</td>
<td>63</td>
<td>BC</td>
<td>65</td>
<td>C</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td>74</td>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Mean absolute</td>
<td></td>
<td></td>
<td>36 dm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>