Results of the 9th Needle/Leaf Interlaboratory Comparison Test

Alfred FÜRST

Austrian Federal Research and Training Centre for Forests
9th Ringtest - Level II laboratories
Percentage of correct results

Austrian Federal Research and Training Centre for Forests
### Percentage of „non tolerable“ results

<table>
<thead>
<tr>
<th>Element</th>
<th>6th Test</th>
<th>7th Test</th>
<th>8th Test</th>
<th>9th Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
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<td>7,3</td>
<td>6,1</td>
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<tr>
<td>S</td>
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<td>10,3</td>
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<td>P</td>
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<td>K</td>
<td>7,7</td>
<td>4,8</td>
<td>5,6</td>
<td>3,3</td>
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</tbody>
</table>
Progress in Quality - "non tolerable" results

Austrian Federal Research and Training Centre for Forests
### Percentage of „non tolerable“ results

<table>
<thead>
<tr>
<th>opt. Element</th>
<th>±/−</th>
<th>6th Test</th>
<th>7th Test</th>
<th>8th Test</th>
<th>9th Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zn</td>
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<td>8,9</td>
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<tr>
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<td>7,1</td>
<td>9,9</td>
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<tr>
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<tr>
<td>C</td>
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<td>15,6</td>
<td>7,8</td>
<td>4,3</td>
<td>11,1</td>
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</tbody>
</table>
Progress in Quality - "non tolerable" results

Expert Panel Meeting Prague

Austrian Federal Research and Training Centre for Forests
Trends in analytical methods

- Element analyzers for N and C
- Closed acid digestion method & ICP-AES for S, P, K, Ca, Mg, Fe, Zn, B, Cu
- Closed acid digestion method & ICP-MS or Flameless AAS for Cd, Pb and Cu
- X-ray fluorescence for S, Ca, Mg, K, Zn and Mn
Problematic methods

- Dry ashing methods for pretretment (not recommended!!)
- Nephelometric determination of sulphur
- X-ray fluorescence for phosphorous in spruce needles
- Calibration problems with element analyzers
Future of the Foliage Ringtests

• Annual ringtest programme (10th Test is running)
• Guaranteed financing (participation fee)
• Reference and Ringtest material for labs
• Lower tolerable limits (fixed by the 10th EP- Meeting Foliage and Litterfall) for mandatory parameter S, P, K, Ca, Mg
New Tolerable limits

• Nitrogen 10%
• Sulphur 15%
• Phosphorous 10%
• Calcium 10%
• Magnesium 10%
• Potassium 10%
• Zinc 15%
• Manganese 15%
• Iron 20%
• Copper 20%
• Lead 30%
• Boron 20%
• Cadmium 30%
• Carbon 5%