

## GENERAL INFORMATION

<b>author(s)</b>	Van den Bilcke N
<b>year</b>	2008
<b>English title</b>	Determination of the aboveground uptake of <sup>15</sup> N by broadleaved tree species
<b>original title</b>	Bepaling van de bovengrondse opname van <sup>15</sup> N door loofboomsoorten
<b>reference</b>	Msc thesis, Ghent University, Ghent
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<b>ecosystem service</b>	regulating – N
<b>keywords</b>	
<b>taxa</b>	<i>Betula pendula</i> , <i>Fagus sylvatica</i> , <i>Fraxinus excelsior</i> , <i>Acer pseudoplatanus</i> , <i>Sorbus aucuparia</i> , <i>Quercus robur</i> , <i>Quercus rubra</i>
<b>project</b>	
<b>supervisor</b>	Verheyen K, Boeckx P
<b>institution</b>	Laboratory of Forestry, ISOFYS
<b>document</b>	pdf, hardcopy
<b>data</b>	

## MATERIALS & METHODS

<b>study area</b>	5j, 5k, 5m, 5n, 6b
<b>time period</b>	July–October 2007
<b>goal</b>	Determination of the water storage capacity of branches and leaves of 6 broadleaved tree species in calm and windy conditions. Determination of the <sup>15</sup> N uptake from water or gas by the leaves of 4 broadleaved tree species.
<b>set-up</b>	<p>water storage capacity</p> <ul style="list-style-type: none"> <li>- 6 tree species: birch, beech, ash, sycamore maple, rowan, oak</li> </ul> <p>wash experiments</p> <ul style="list-style-type: none"> <li>- <sup>15</sup>N NO<sub>3</sub><sup>-</sup>, <sup>15</sup>N NH<sub>4</sub><sup>+</sup></li> <li>- pre-test: beech (13-14 August), lab + field experiment, # sprinklings different</li> <li>- main experiment: beech, red oak, ash, sycamore maple</li> <li>- treated (Table 2.1 p 39) and untreated branches</li> <li>- branches sprinkled with enriched rainfall water, 2 times (30/09, 14/10)</li> </ul> <p>gas experiments</p> <ul style="list-style-type: none"> <li>- <sup>13</sup>C CO<sub>2</sub>, CO<sub>2</sub>, <sup>15</sup>N NH<sub>3</sub></li> <li>- pre-test: beech (12/09), CO<sub>2</sub> gas concentrations analyzed for 1 branch, <sup>15</sup>N experiment for 6 branches (gas concentration and branch analysis)</li> <li>- main experiment: beech, red oak, ash, sycamore maple (05/10)</li> </ul>
<b>data collection</b>	<p>water storage capacity</p> <ul style="list-style-type: none"> <li>- 6 branches harvested per species (24–26 July): weighed – branch+leaves, branch+leaves sprinkled with water, wet branch+leaves after shaking, wet branches, dry branches</li> <li>- leaf area, branch area</li> </ul> <p>wash experiments</p> <ul style="list-style-type: none"> <li>- branches sprinkled with deionised water (water storage capacity), wet mass branches and leaves</li> <li>- leaves carefully rinsed off with deionised water (to remove attached <sup>15</sup>N), air-dried and weighed, oven-dried &amp; weighed</li> <li>- ground and analyzed for <sup>15</sup>N enrichment</li> <li>- nutrient concentrations (P, Ca, K, Mg) for a subset of samples</li> </ul> <p>gas experiments</p>

	<ul style="list-style-type: none"> <li>- gas concentrations, before gas addition and before branch sampling</li> <li>- branches dried (air and oven) + weighed</li> <li>- ground and analyzed for <sup>15</sup>N, <sup>13</sup>C enrichment</li> </ul>
<b>remarks</b>	<p>map with sampled trees on p 36</p> <p>Table with wash/gas experiment set-up on p 39</p>

## RESULTS

The water storage capacity of leaves was significantly lower in windy conditions (after shaking). The WSC of branches was highly variable, and no significant difference was found between calm and windy conditions. The WSC of branches was higher than that of leaves; opposite to the pattern for the WSC per mass unit. Sycamore maple had the lowest leaf WSC and the lowest SLA. Beech had the highest SLA and the highest WSC (except for rowan) in calm conditions.

The N and C content of the leaves differed between the tree species and between sampling dates. Ash and sycamore maple leaves had a higher N content than the other species. The C content was highest for red oak and lowest for ash. The N content decreased between September and October. The N concentration was much higher than the P, Ca, Mg, K concentrations, except for ash, which showed high Ca leaf concentrations. The leaves of ash and sycamore maple were rich in nutrients.

The uptake/retention of <sup>15</sup>NH<sub>4</sub><sup>+</sup> was higher than the uptake/retention of <sup>15</sup>NO<sub>3</sub><sup>-</sup> for all tree species in September, and for red oak and sycamore maple in October. The total uptake of N was highest for beech in September and for ash in October. Red oak uptake of <sup>15</sup>NH<sub>3</sub> was lower than for the other species. Thus, the N uptake differed between species, treatment, and date.