GENERAL INFORMATION

author(s)	Van Slycken S
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English title	Stem and branch respiration of beech (*Fagus sylvatica* L.) in greenhouses and field conditions
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taxa	*Fagus sylvatica*, *Corylus avellana*, *Acer pseudoplatanus*
project	
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institution	Laboratory of Plant Ecology
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data	

MATERIALS & METHODS

study area	5n (scientific zone)
time period	
goal	- Comparison of the different methods for measuring CO2 efflux - Evaluation of different units of CO2 efflux - Study of the CO2 efflux dynamics of beech at stem and branch level - Comparison of the CO2 efflux rate of beech, sycamore, and hazel - Modelling the CO2 efflux rate as a function of temperature - Validation of the model - Simulation of the total autotroph CO2 efflux of the woody biomass in the Aelmoeseneie forest
set-up	field conditions: temperature (air and tissue) and CO2 efflux (stem or branch) greenhouse: effect of temperature, comparison NaOH and soda lime upscaling: surface or volume method, N content measurement, volume living cells
data collection	field conditions trees - hazel (3, i.e., nº 291, 2 others): branch respiration - sycamore (3): branch respiration - beech (3 + beech next to the tower, i.e., 185, 180, 139, 229): stem & branch respiration respiration - branch (18) or stem (3) samples - 1.5, 7, 14, 21 m height temperature - Pt 100 sensor: 1, 7, 14, 21, 28, 35 m (air), - 4 cm (soil) - Cu-constantan thermocouple: halfway sampled branch segment at 7, 14, 21 m (tissue) - 10 sec measurements, 5 min data greenhouse - 6 sample trees - air and tissue temperature (Cu-constantan thermocouple): 10 sec measurement, 5 min data

	upscaling - upper and lower diameter of the sampled segments - N content: branch segments, tree cores (not the sampled trees), Kjeldahl N - Volume living cells: same samples as for the N content: coloured tangential microslides
remarks	scheme sampling p 44 and 45 data for ash and oak come from Denys_2003_th and VanHecke_2002_th

RESULTS

The NaOH and the soda lime technique yielded similar results in the greenhouse. The easier soda lime method was used in field conditions. Locking the measuring cuvettes airtight was difficult in field conditions.

For beech, CO_2 efflux rate is best expressed per unit of surface area as only the living tissues close to the bark are respirating.

The CO_2 efflux rate shows a seasonal dynamic: high efflux at the end of summer at high temperatures, low efflux during autumn, minimum efflux during winter, increasing efflux because of the increasing temperature during spring.

No differences between hazel and sycamore for CO_2 efflux rate, but beech differed. CO_2 efflux of stem and branches of beech was different. No correlation was found between height in the crown and CO_2 efflux rate.

The changes in tissue temperature occurred 95 minutes later than those in air temperature, but no such difference was found in the greenhouse. No differences were found when daily mean temperature was used.

Using an exponential model between temperature and CO_2 efflux (low coefficient of determination!), the CO_2 efflux was calculated for the Aelmoeseneie forest, based on the temperature data for 1997 and the theses of Denys_2003 and VanHecke_2002. Aboveground biomass gave an efflux of 1.7 ton C/ha (0.4 for beech), similar to the results of Denys_2003, but different from VanHecke_2002 and Verbeeck_2002.