GENERAL INFORMATION

author(s)	De Frenne P, De Schrijver A, Graae BJ, Gruwez R, Tack W, Vandelook F, Hermy M, Verheyen K
year	2010
English title	The use of open-top chambers in forests for evaluating warming effects on herbaceous understorey plants
original title	
reference	Ecological Research 25
pages	163–171
type	article (a1)
ecosystem service	supporting - biodiversity
keywords	herb layer – global warming
taxa	*Anemone nemorosa*
project	PhD_DeFrenne
supervisor(s)	Verheyen K, Hermy M, Graae BJ
institution	Ghent University, Laboratory of Forestry
document	pdf, hardcopy
data	

MATERIALS & METHODS

study area	5n (scientific zone)
time period	February–May 2008, September 2008–May 2009
goal	Are OTCs useful devices to gain insight in the impact of a warming climate on herbaceous understorey plants in a temperate deciduous forest ecosystem?
set-up	6 open top chambers (OTCs) in a natural *Anemone nemorosa* carpet: 60 cm high, hexagonal (sides 66.4 cm at the base and 34.6 cm at the top), covered 1.15 m², made of extruded polycarbonate - 3 of them covered with permeable polypropylene GardenFleece (OTC+GF) - 6 paired control plots (C) - first sampling period in-depth study: 5 OTCs-GF & 5 control plots, second sampling period
data collection	abiotic variables inside 2 OTCs, 2 OTCs+GF and 2 Cs - soil surface temperature (litter layer; 0 cm depth) and air temperature (10 cm above ground level) at 15 min intervals - daytime relative air humidity (10 cm above ground level; RH) every 5 days in April 2008 six manual rain gauges in an open-field grassland area adjacent to the forest stand - half were covered with GF - cumulative precipitation weekly 20 March–16 May 2008 biotic variables (per plot) - phenology: number of open flowers every 3–5 days, 25 February – 1 May 2008 - growth: o total plant height (incl. flowers) of the 8 tallest wood anemones (evenly spread per quadrant) weekly o total oven-dried above-ground dry matter biomass at seed maturity o 10 individuals (above-ground ramets) flat oven-dried: leaf area, leaf dry matter, specific leaf area o Leaf samples pooled per plot: N, C, - reproduction (08/05/2008): seed number (10 ramets per plot), dry mass, germinability (in incubator) in-depth study:

	- soil temperature (5 cm depth), soil surface temperature (litter layer, 0 cm depth), air temperature (10 cm above ground level), relative air humidity (10 cm above ground level, %) and soil moisture (0–5 cm depth) at 40-min intervals between 17/09/2008 & 8/05/2009 - PAR at a 1-min interval for 5 days in February 2009 - CO_2 concentration at 10 cm above ground level
remarks	

RESULTS

The vernal forest geophyte *A. nemorosa* showed a phenotypic response in certain plant traits to the rise in temperature before canopy flush. Above-ground dry matter, SLA, leaf N and C content, seed mass, germination percentage did not differ significantly between OTCs and control.

	OTC+GF	**OTC-GF**	**control**
air and soil temperature	++	+	
cumulated precipitation	-		
flower senescence	accelerated		
plant height	+	+	
number of seeds	-		

Temperature differences were smaller after canopy flush; temperature differences were larger for air temperature > surface temperature > soil temperature. In-depth study: relative humidity was a bit higher in the OTC, PAR was lower in the OTC before the canopy flush, CO_2 concentration was similar, soil moisture was higher in the OTC.

OTCs can be useful to study the effect of climate warming on forest herbs before canopy flush, if the ecological drawbacks (e.g., with regard to reproduction) are taken into account.