GENERAL INFORMATION

author(s)	Vanoverbeke M
year	1998
English title	Determination of the actual evapotranspiration of a broadleaved forest based on the surface temperature using the one-layer and the multi-layer approach
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project	
supervisor	Lemeur R, Samson R
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data	

MATERIALS & METHODS

study area	5n (scientific zone)
time period	August–October 1997
goal	Modelling the surface temperature based on measured meteorologic data. Calculating the actual evapotranspiration of the mixed broadleaved forest Aelmoeseneie.
set-up	models - big leaf model (one layer) with calculated and measured surface temperature - Penman-Monteith - multilayer model with calculated surface temperature
data collection	measuring tower: shortwave radiation, albedo (hourly mean), air temperature (30 min mean), wind speed, air humidity, precipitation, throughfall (hourly mean), IR temperature (10 min mean, 13 August - 30 October)
remarks	refinement of the method of Claeys_1997_th for calculating the surface temperature

RESULTS

Description of the climatologic parameters, the crop resistance, the short-wave radiation, the IR temperature, and the aerodynamic resistance for a sunny day (17 August) and a cloudy day (22 August).The calculated surface temperature is shown.

Extinction coefficients for shortwave radiation could be estimated for oak and beech, but not for ash. The correlation between aerodynamic resistance and wind speed was low on the sunny day. The measured and calculated temperatures were related linearly, with a much lower deviation than in Claeys_1997_th. The calculated temperature was an overestimation of the measured temperature.

Calculated values of evapotranspiration with the one-layer model were 2385 mm (potential E), 333 mm (actual E, Penman-Monteith), 313 mm (actual E, latent heath flux, corrected for precipitation and dew), and 289 mm (actual E, latent heath flux, no correction). The multi-layer model gave 301 (oak), 200 (ash), 217 (beech), 240 (total) mm evapotranspiration during the growing season. Oak shows the largest transpiration in layer 2 (largest LAI); ash showed similar transpiration in layer 2 and 3; and for beech, transpiration occurred mainly in the top layer. Oak showed a larger transpiration than beech although the LAI of beech was larger.

The calculation of the one-layer model may be more correct than the calculations of the multi-layer model, because some parameters of the multi-layer model were lacking: the model could not account for the spatial heterogeneity in the forest.