# *Sphagnum* Production and Decomposition in a Mountain Raised Bog

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I investigated growth, production, decomposition and decomposability in six dominant *Sphagnum* species in a Central European mountain patterned mire (Rokytecká slať, Bohemian Forest, CZ) during the 2000-2001seasons.

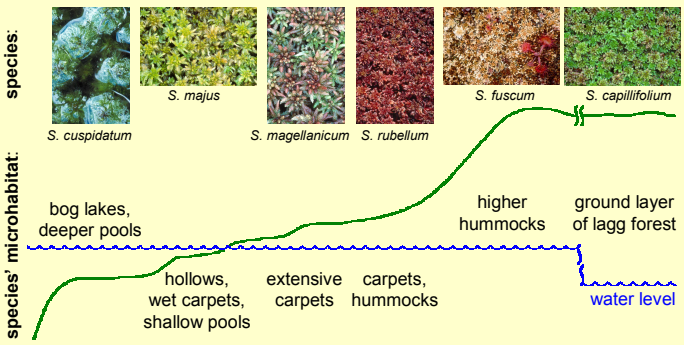
The aim of my study was to compare the dynamics of production and decay in six ecologically different but coexisting species.

Net primary production was weakly higher in closely and slowly growing hummock-forming *Sphagna* (*S. fuscum* and *S. rubellum*), whilst lower productivity was found in quickly growing but lax carpets of *S. majus* and *S. cuspidatum* in wet habitats. All species showed the highest growth rate during the wet summer of 2001, no differences were observed between the two autumn seasons and spring.

Decomposition was investigated by litter-bag method for six *Sphagnum* species in their microhabitats and for cellulose. Decay rate didn't differ significantly between the species' microhabitats, but that of cellulose was slower in wet microhabitat of *S. majus* and *S. cuspidatum*. Thus these two species have higher decomposability.

Due to their differences in decomposability and similar production and decomposition rates, *Sphagnum* species are supposed to participate in differentiated development and maintenance of coexisting hummocks and hollows or others bog surface elements.

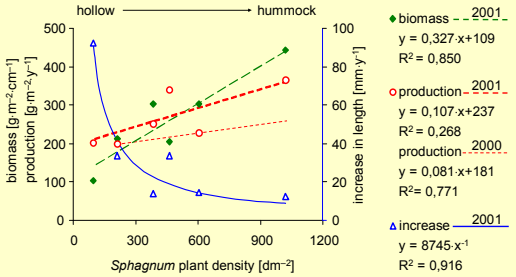
## Studied *Sphagnum* species on hummock-hollow gradient



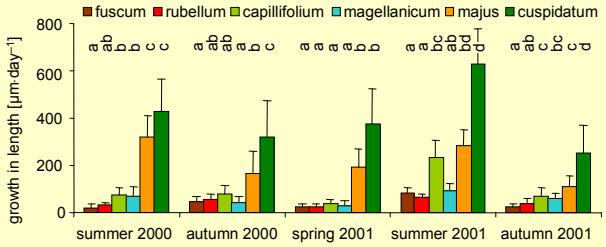

## Characteristics of *Sphagnum* covers

Relationship between the density of *Sphagnum* mats and their biomass, production and increase in length. All values were determined by single measurement at the end of the season of 2001. Displayed are averages (n=3) for all six species.

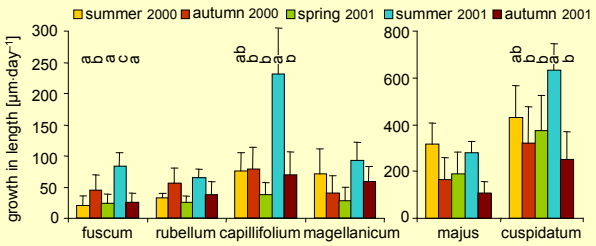
Slowly growing hummock-forming *Sphagna* compensate their annual production by higher biomass in dense cushions.




## Annual dynamics of growth rates

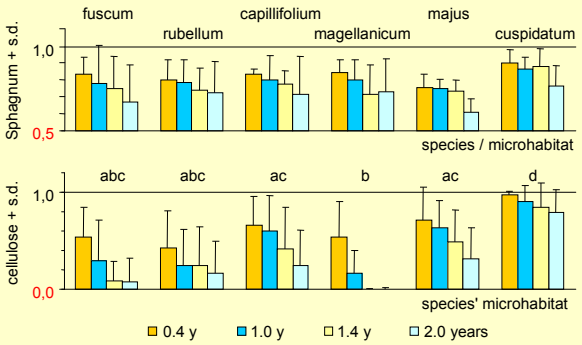



Growth rates [µm·day⁻¹] in six *Sphagnum* species in five successive seasons. Different letters show significant differences between seasons within species.




Growth rates [µm·day⁻¹] in six Sphagnum species during five successive seasons. Different letters show significant differences between species within seasons.

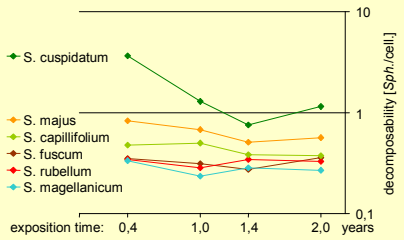
## The course of *Sphagnum* and cellulose decay




## *Sphagnum* decomposability

*Sphagnum* and cellulose decomposability expressed as ratio of % of decayed *Sphagnum* and cellulose (cellulose as uniform substrate).

Generally, decomposability of *Sphagnum* mosses decreases from species in wet microhabitats to hummock-forming species. This may be caused by e.g. higher amount of nutrients (N, $M^{++}$) in wet habitats or higher concentrations of antibiotic compounds (sphagnan) in hummock-forming species.




However, this approach to expressing decomposability has two bugs: i) too low or zero values in absolutely decayed samples of cellulose and ii) a possibility that *Sphagnum* decay can be controlled by other factors than in cellulose.

| | | *Sphagnum* | | *cellulose* | |
|---|---|---|---|---|---|
| factor | d.f. | F | p | F | p |
| species / habitat (A) | 5 | 2.17 | 0.0725 | 11.70 | **< 0.0001** |
| time (B) | 4 | 58.97 | < 0.0001 | 92.58 | < 0.0001 |
| interaction (A×B) | 20 | 0.65 | 0.8712 | 3.37 | **< 0.0001** |

Diagram and results of two two-way ANOVAs for the course of *Sphagna* and cellulose decay. Time' is 'repeated factor', so the 'interaction' with time represents *decay rate*. Different letters in cellulose decay show significant differences in species' microhabitats.

All *Sphagnum* mosses decompose slowly, and there are no significant differences between them (probably because of high variability in data). In spite of its huge variability, cellulose decay was obviously slow in wet microhabitats.