

Small-scale patterns of plant species richness in the central European landscape

M.-A. Allers & J. Dengler

Our aim was to measure the average plant species richness of the central European landscape at different spatial scales, to analyse its spatial patterns, and the correlations with environmental factors. We studied the area of the topographic map sheet 2728 (Lüneburg) in Lower Saxony. Within this area (126 km²), we placed 50 series of nested plots randomly and irrespectively of homogeneity with the help of a GPS. In each series, we sampled all species of vascular plants, bryophytes, and lichens on plots of 0.0009 m², 0.01 m², 0.09 m², 1 m², 9 m², and 100 m², with four replicates for all plot sizes besides the largest. We found an average of 1.63 species on 1 cm² and 38.7 on 100 m² (range: 2–137) (Table 1). On 100 m², bryophytes contributed 15% and lichens 11% to the average plant species richness. The most frequent species on all plot sizes besides the smallest was the moss *Brachythecium rutabulum*, which occurred in 8% of all 1-cm² plots and in 84% of all 100-m² plots.

The species-area relationship was best described by a power law with a mean z -value (increment) of 0.22 (fitted for $\lg S$). Besides substantial differences in the z -values between individual plot series (range: 0.15–0.41), z -values showed a general pattern of scale-dependency with a

minimum between 0.0009 and 0.01 m² (Fig. 1). The observed increase towards the larger plot sizes differs from findings within homogeneous vegetation stands, where z -values generally remain constant or even decrease with increasing plot area. We further analysed the species-area relationship separately for taxonomic groups and species of different floristic

status (native, archacophyte, neophyte, ornamental plant), and correlated diversity parameters to stand structure, landscape type, and site conditions.

Table 1: Mean plant species densities (vascular plants, bryophytes and lichens) at different plot sizes ($n = 50$)

Plot size [m ²]	Species richness	
	Mean	SD
0 0001	1.63	1.03
0 0009	2.39	1.33
0.01	3.46	1.93
0.09	5.10	2.76
1	8.41	4.64
9	15.38	8.31
100	38.70	25.51

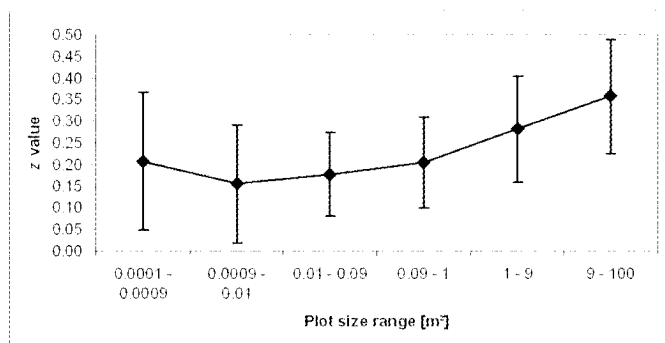


Fig. 1: Scale-dependency of z values (mean \pm SD) in randomly placed nested plots ($n = 50$).