Christina Westphal, Nils Tremer, Goddert von Oheimb, Jan Hansen, Klaus von Gadow, Werner Härdtle (2006): Is the reverse J-shaped diameter distribution universally applicable in European virgin beech forests? Forest Ecology and Management 223:75-83.

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Abstract

The study presents an analysis of the diameter distributions of nine virgin beech forests (Fagus sylvatica) in south-eastern Europe. Data were collected from published and unpublished sources. We included predominantly full calliperings of coherent areas between 3.6 and 13.0 ha of size. The objective of the study was to compare and characterize the curve forms and to test systematically which mathematical function provides a better fit: the negative exponential function, third or seventh degree Weibull functions. The parameters were estimated applying the maximum likelihood method. To evaluate the goodness of fit, the absolute discrepancy was used. The residuals were examined with respect to systematic deviation.

The nine virgin forests displayed a great variety of structures, only four out of 36 possible pairs of diameter distributions were found to be from the same population. The negative exponential model produced a good fit for four of the nine empirical distributions. However, the analysis of the residuals produced by the models exhibited systematic errors. Both the negative exponential and the third degree Weibull function underpredict to some extent the number of stems in the midsize diameter range in all nine stands. The higher number of trees frequently found in the midsize range of the empirical distributions as compared to the models indicates a common trend towards a rotated sigmoid diameter distribution. For some stands even a tendency towards two peaks in the

distribution can be found. These results reveal that the reverse J-shaped curve form is not the only applicable model for describing diameter distributions in virgin beech forests. The systematic nature of the deviations from the negative exponential curve leads us to conclude that we might have found a general trend typical for virgin beech forests in south-eastern Europe.

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