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Oak often needs to be promoted in mixed beech-oak stands - the structural processes behind competition and silvicultural management in mixed stands of European beech and sessile oak
iForest – Biogeosciences and Forestry – doi: 10.3832/ifor3172-013

Tab. S1 - Overview of the structural indices used in this study.

Number	Index	Description	Equation	Symbols and letters description	Structural feature	Type
1	***D_q***	Quadratic mean diameter (cm)	$\sqrt{\sum_{i=1}^{n} {d_i}^2/n}$	d_i: the dimeter at breast height (cm) of i-tree n: the number of measured trees within each plot S: the plot area (m^2)	Stand properties measures	Non-spatial
2	***BA***	Basal area (m^2ha^{-1})	$\frac{10000}{S} \times \left(\sum_{i=1}^{n} \frac{\pi}{4} \times d_i^2\right)$			
3	***N***	The number of trees per hectare	$\frac{10000}{S} \times \left(\sum_{i=1}^{n} n_i\right)$			
4	***SDI***	Stand density (Reineke 1933)	$N \times \left(\frac{25}{D_q}\right)^{-1.605}$	N: the number of trees per hectare D_q: the quadratic mean diameter (cm)	Stand density	
5	***Con***	Contagion (Hui & Gadow 2002)	$\frac{\sum_{i=1}^{N_s} \left(\frac{1}{4} \times \sum_{j=1}^{4} A_j\right)}{N_s}$	N_s: the number of reference trees in each plot i: the single reference tree j: the number of neighbours α: the standard angle where A_j=1 if $\alpha < 72°$ otherwise A_j=0 0 (regularity) ≤ *Con* ≤ 1 (clustering)	Horizontal tree distribution pattern considering four nearest neighbours	Spatial

Number	Index	Description	Equation	Symbols and letters description	Structural feature	Type
6	***Agg***	Aggregation (Clark & Evans 1954)	$\frac{\sum_{i=1}^{N_S} r_i}{N_S} \times \frac{1}{2 \times \sqrt{\frac{N_S}{S}}}$	N_s: the total number of reference trees in each plot S: the plot area (m^2) r_i: the distance between i reference tree and its first nearest neighbour Agg=1: randomness Agg<1: clustering 1<Agg ≤ 2.4191: regularity	Horizontal tree distribution pattern considering first nearest neighbour	
7	I_P	Distribution index (Pielou 1959)	$\pi \times \frac{N_p}{S} \times \bar{r}^2$	$\bar{r}$: the mean square distances from the randomly chosen points to their nearest tree N_P: the number of points S: the plot area (m^2) $I_P = (N_p\text{-}1)/N_p$: randomness $I_P \geq (N_p\text{-}1)/N_p$: clustering $I_P \leq (N_p\text{-}1)/N_p$: regularity	Horizontal tree distribution pattern considering random points and their first nearest tree	
8	***Dif***	Diameter differentiation (Füldner 1995)	$\frac{\sum_{i=1}^{N_S}\left(\sum_{j=1}^{4}\left(1-\frac{min(d_i,d_j)}{\max(d_i,d_j)}\right)\right)}{N_S}$	N_s: the total number of reference trees in each plot S: the plot area (m^2) d_i: d of i reference tree (cm) d_j: d of j nearest neighbour (cm) 0 (diameter equality) ≤ Dif ≤ 1 (diameter differentiation)	Tree size differentiation considering four nearest neighbours	Spatial

Number	Index	Description	Equation	Symbols and letters description	Structural feature	Type
9	***Dom***	Diameter dominance (von Gadow & Hui 2002)	$\frac{\sum_{i=1}^{N_S}\left(\frac{1}{4}\times\sum_{j=1}^{N_S} dm_j\right)}{N_S}$	N_s: the total number of reference trees in each plot S: the plot area (m^2) dm_j=0 if the neighbour tree j is larger than reference tree i, otherwise dm_j=1 0 (complete dominance of neighbours) ≤ *Dom* ≤ 1 (complete dominance of reference tree)		
10	$\boldsymbol{D_{var}}$	Coefficient of variation of diameters (Pretzsch 2009a)	$\left(\frac{\sqrt{\sum_{i=1}^{N_S}\frac{(d_i-\bar{d})^2}{N_S-1}}}{\bar{d}}\right)\times 100$	N_s: the total number of reference trees in each plot d_i: d of i reference tree (cm) $\bar{d}$: arithmetic mean diameter of trees at breast height (cm) Increasing D_{var} refers to increasing diameter variation.	Tree size differentiation considering all trees	Non-spatial
11	***Ming***	Species mingling (Füldner 1995)	$\frac{\sum_{i=1}^{N_S}\left(\frac{1}{4}\times\sum_{j=1}^{N_S} m_j\right)}{N_S}$	N_s: the total number of reference trees in each plot S: the plot area (m^2) m_j=0 if the neighbour tree j belongs to the same species of reference tree i, otherwise m_j=1 0 (all neighbours have same species of reference tree) ≤ *Ming* ≤ 1 (all neighbours of different species to reference tree)	Tree species intermingling considering four nearest neighbours	Spatial

Number	Index	Description	Equation	Symbols and letters description	Structural feature	Type
12	***Seg***	Species segregation (Pielou 1977)	$1 - \frac{observed\ number\ of\ mixed\ pairs}{expected\ number\ of\ mixed\ pairs}$	$-1 \leq Seg < 0$: species mingling $Seg = 0$: independent distribution $0 < Seg \leq 1$: species segregation	Tree species intermingling considering first nearest neighbour	