

HOW TO MEASURE FOREST DIVERSITY

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- The diversity of a tree stand means richness of tree species, and wide variation in size, age and genotype within each species.
- A biologically diverse stand is composed of a mixture of tree species of all sizes and all ages.
- Biodiversity also presupposed some amount of decaying standing and fallen trees and of charred woody material.
- The main diversity indicators within forest stands are presented in the table.
- For assessing LLNS-diversity index in practice, a form based on the table can be used or a mathematical programming model developed with the same indicator scores.

LLNS-INDEX for a forest stand. The values for pine, birch and aspen are given as an example.

Tree species	DBH 2-10 cm stems/ha		DBH 10-25 cm stems/ha		DBH > 25 cm stems/ha		Standing dead trees D> 10 cm m ³ /ha		Fallen dead trees D> 10 cm m ³ /ha		Total
	100- 500-	10- 50-	1- 5	0.5- 2-	0.5- 2-	0.5- 2-	0.5- 2-	0.5- 2-			
Scots pine	0.5	1	1.5	2	2	3	1	2	1	2	
Birch	1	1.5	2	3	3	4	2	3	2	3	
Aspen	1	1.5	3	4	4	5	3	4	3	4	
Growing stock (DBH≥2 cm)		Basal area, m ² /ha		5- 10- 15- 20- 25-		1 2 3 4 5					
Seedlings (DBH<2 cm)		Density, stems/ha		<1000 1000- 5000-		1 2 3					
Undergrowth (h≥20.5 m, DBH<2 cm)		Coverage (relative density), %		1- 20- 60-		1 2 3					
Special trees		Number/Significance		1 2-3 4		1 2 3					
Charred wood (D> 10 cm)		Volume, m ³ /ha		0.2 20 40-		1 2 3					
LLNS-diversity index											

Comparison of within-stand diversity according to LLNS-index between single tree selection and low thinning after first commercial cutting on a fertile site. p = significance level (t-test).

	Stems/ha	Basal area, m ² /ha	LLNS
Single tree selection	1404	23.8	18.1
Low thinning	1005	23.5	19.1
p	0.000	0.776	0.000



An even-sized, pure Scots pine stand after low thinning. LLNS-diversity index is 7. Scoring: Pine DBH >25 cm >5 stems/ha = 3. Basal area 24 m²/ha = 4.



A naturally regenerated Scots pine-dominated stand. LLNS-diversity index is 15. Scoring: Pine DBH >25 cm >5 stems/ha = 3, DBH 10-25 >50 stems/ha = 2; Spruce DBH 2-10 110 stems/ha = 0.5; Birch DBH 2-10 505 stems/ha = 1.5; Basal area 22 m²/ha = 4; Undergrowth, 65% = 3; Charred wood, 0.5 m³/ha = 1.