Department of Silviculture at FFWT MENDELU in Brno

Subject: **Forest establishment**

AN EVALUATION OF MORPHOLOGICAL QUALITY AND THE HEALTH CONDITION OF THE PLANTING STOCK

Author:

Field of study:

Academic year:

Department of Silviculture at FFWT MENDELU in Brno

Subject: **Establishment of Woody Vegetation**

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EVALUATION OF THE QUALITY OF THE PLANTING STOCK

(assignment sheet)

Assignment: The customer ordered the delivery of planting stock of …… from the University Forestry Enterprise Masarykův Les Křtiny MENDELU in Brno, whose cultivation pattern is …… Your task is to evaluate its quality.

An evaluation for the final report assessing whether the material complies with the valid standard ČSN 48 2115 should be performed according to the following criteria:

➢ height of above-ground part (AG) (cm)	…determine the height range in the header of the table
➢ minimum root collar (RC) diameter (mm)	…ČSN page 8, tab. 1
➢ ratio of AG height and RC diameter	…according to the height range and the header limit in the table
➢ form the above-ground part	…ČSN page 10
➢ root system (RS) distribution	…ČSN page 14, tab. 1
➢ root deformation	…ČSN page 14, presentation
➢ ratio of the volume of RS and AG	…ČSN page 11, tab. 4
➢ percentage of fine roots	…ČSN page 11, tab. 4
➢ health condition	...estimate
➢ potential of the sorption ability of RS	...according to the formula provided
➢ lignification	...with fluoroglucinol in an acidic environment (HCl) on the last increment of the plant
➢ starch reserve	...with lugol somewhere on the plant
➢ condition of the desiccating cavities	…according to the supplied picture attachment
➢ electric conductivity	…electric conductivity meter

Protocol content:

- title page,
- assignment sheet,
- tables (filled out) with an evaluation of the planting stock
- an evaluation of the planting stock according to individual criteria (how many plants correspond to the standard ČSN 48 2115),
- conclusion (how many plants overall correspond to the standard, a proposal for their use).

Note: If the plant does not meet 1 or more criteria, it does not correspond to standard ČSN 48 2115. If more than 5% of the plants are unsatisfactory, the planting stock generally does not correspond to standard ČSN 48 2115 (i.e. is not of good quality).

Bibliography: ČSN 48 2115

An evaluation of the morphological quality of the planting stock

Plant serial number	Height of AG 1, 26 – 35 cm 2, 36 – 50 cm 3, 51 – 70 cm		RC diameter (mm)		Height of AG (cm) RC diameter (cm) 1, < 70; 2, < 83; 3,< 100		Form of AG	RS distribution	RS deformation	RS volume (ml) AG volume (ml) 1, 1 : 2 2, 1 : 3 3, 1 : 4		Percentage of fine root volume (%)	
1		*		*		*	*	*	*		*		*
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
ø													

Note: * if correspond, write down 1, if not, write down 0

An evaluation of the physiological quality and health condition of the planting stock

Plant serial number	Health condition	Potential of the RS sorption ability		Lignification	Starch reserve	Condition of the desiccating cavities	Electric conductivity
1	*		*	*	*	*	*
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

Note: * if correspond, write down 1, if not, write down 0

POTENTIAL OF THE SORPTION QUALITY OF THE ROOT SYSTEM – I

$$I = P * K * \frac{M}{100}$$

P - the amount and intensity of branching of lateral roots

- by estimation
- a three-member scale
  1. sparse, irregular branching
  2. frequent and regular branching
  3. dense branching

K - the density of short roots (root tips)

- by estimation
- a three-member scale
  1. sparse roots, with a small number of short roots
  2. roots with numerous short roots
  3. roots with regular and numerous short roots

M - % of mycorrhiza

- by estimation

I - from 0.1 to 9.0

- the larger the number, the better
- operational evaluation - **I > 4.5**

Making estimates requires experience.

Table 1 - Dimensions of standard forest planting stock (seedlings, plants, semi-saplings and saplings)

	Bare-rooted seedlings								**Containerized seedlings**								**Plants**								**Large-size plants**				**Saplings**			
Code [f)]	1		2		3		4		1K, 1V		2K, 2V		3K, 3V		4K, 4V		5, 5K, 5V		6, 6K, 6V		7, 7K, 7V		8, 8K, 8V		9, 9K, 9V		10, 10K, 10V		11, 11K, 11V		12, 12K, 12V	
Range of height above-ground part (cm)	10-14		15-25		26-50		51-80		10-14		15-25		26-50		51-80		15-25		26-35		36-50		51-70		51-80		81-120		121-180		181-250	
	Diameter [a)]	Max. age	Diameter [a)]	Max. age	Diameter [a)]	Max. age	Diameter [a)]	Max. age	Diameter [a)]	Max. age	Diameter [a)]	Max. age	Diameter [a)]	Max. age	Diameter [a)]	Max. age	Diameter [a)]	Max. age [b)]	Diameter [a)]	Max. age [b)]	Diameter [a)]	Max. age [b)]	Diameter [a)]	Max. age [b)]	Diameter [a)]	Max. age [b)]	Diameter [a)]	Max. age [b)]	Diameter [a)]	Max. age [b)]	Diameter [a)]	Max. age [b)]
Pinus nigra	3	2															4	2	5	3	6	4			8	4						
Pinus mugo																		4		5												
Pinus sylvestris	3	2	4	2													4	3	5	3	6	3			7	4						
Douglas fir			3[c)]	2															4	3	5	3			7	4						
Abies alba																	5	5	6	6	7	6			8	7						
Abies grandis																			6	4	7	5			8	5						
Larix decidua			3	1	4	2													4	3	5	3	6	4	7	4	8	5				
Picea abies			4[c)]	2															5	5	6	5	7	5	8	5	10	5				
European beech, oak, hornbeam					5[d)]	2											4	2	5	4	6	4	7	4	9	5	11	6	14	7	16	7
Tilia					6	2													7	3	8	4	9	4	10	5	11	6	16	6	18	6
Maple, ash, elm, cherry					4	2											4	2	5	4	6	4	7	4	9	5	10	6	14	6	16	6
Alder, birch, sorbus					3	2	4	3											4	2	5	3	6	3	7	3	10	4	14	6	16	6

NOTES:

Height of above-ground part – For seedlings and plants with a minimum height of 10 cm (code 1, 1K, 1V, 2, 2K, 2V, 5, 5K and 5V), up to 5 cm height tolerance is allowed (only upwards), except for *Pinus sylvestris* and *Pinus nigra*, where the tolerance of the height of the above-ground part is also allowed downwards by up to 3 cm. For plants with an above-ground height of 51-70 cm (codes 8, 8K and 8v), an upward tolerance of up to 10 cm is allowed. For all other above-ground part height ranges, upwards and downwards tolerances of up to 5 cm are allowed.

Root collar diameter – For all above-ground part height ranges, if all other quality parameters specified for the given height range are met, a 10% downward tolerance is allowed for the smallest root collar diameter, except for containerized seedlings grown from sowing into growing containers for a maximum of 1 year, where a tolerance of the smallest root collar diameter of up to 1 mm is allowed. Both tolerances are not allowed in cases where the minimum root collar diameter is 4 mm for *Picea abies* and 3 mm for other species.

REFERENCES AND THEIR SPECIFICATIONS:

[a)] smallest root collar diameter in mm

[b)] when growing planting stock from the 8th and 9th forest altitudinal zones, the maximum age can be increased by 1 year

[c)] for heights of the above-ground part up to 35 cm, a root collar diameter of 4 mm is allowed

[d)] for rooted seedlings of *Picea abies* grown from sowing into growing containers and grown for a maximum of two years, a minimum root collar diameter of 4 mm without any further downward tolerance is allowed

[e)] due to genetically determined growth variability, the main criteria for the planting ability of *Picea abies* originating from the 8th forest altitudinal zone is the root collar diameter assuming compliance with all other quality parameters; a tolerance of 10 cm upwards and downwards is allowed for height ranges of the above-ground parts of plants from the 8th forest altitudinal zone

[f)] the code includes bare-rooted planting stock; a code followed by the letter K stands for any containerized planting stock without the use of air cutting technology; a code followed by the letter V stands for containerized planting stock using the air shear technology

Table 4 - Parameters of a root system of standard forest planting stock

The parameters included in this table relate to bare-rooted and, with the exception of tap root length, also to containerized planting stock of forest tree species.

Tree species	Planting stock	Height of AG (cm)	Minimum ratio of root system volume to above-ground volume (RS : AG)	Minimum percentage of fine roots volume in the overall root system[a)] (%)	Range of the tap root length[b)] (cm)
Spruce	**seedlings**	15 – 25	1 : 2	40	14[c)]
	plants	26 – 35	1 : 2	50	17[c)]
		36 – 50	1 : 3	30	17[c)]
		51 – 70	1 : 4	20	17[c)]
	large-size plants	51 – 80	1 : 3	30	25[c)]
		81 – 120	1 : 5	20	35[c)]
Pine	**seedlings**	10 – 14	1 : 4	40	10 – 14
		15 – 25	1 : 4	20	12 – 20
	plants	15 – 35	1 : 3	40	12 – 20
		36 – 50	1 : 5	20	15 – 20
	large-size plants	51 – 80	1 : 5	20	15 – 20
Larch	**seedlings**	15 – 25	1 : 2	40	10 – 14
		26 – 50	1 : 3	20	12 – 20
	plants	26 – 50	1 : 2	30	15 – 20
		51 – 70	1 : 3	20	15 – 20
	large-size plants	51 – 80	1 : 3	30	15 – 20
		81 – 120	1 : 4	20	26 – 34
Fir	**plants**	15 – 35	1 : 2	25	15 – 20
		36 – 50	1 : 3	20	15 – 20
	large-size plants	51 – 80	1 : 5	20	15 – 20
Pseudotsuga	**plants**	26 – 35	1 : 2	50	15 – 20
		36 – 50	1 : 3	300	15 – 20
	large-size plants	51 – 80	1 : 4	30	15 – 20
Oak, Beech, Maple, Fraxinus	**seedlings**	26 – 35	1 : 1	10	12 – 20
		36 – 50	1 : 2	5	15 – 20
	plants	15 – 35	2 : 1	30	15 – 20
		36 – 50	1 : 1	25	15 – 20
		51 – 70	1 : 2	20	15 – 20
	large-size plants	51 – 80	1 : 1	30	15 – 20
		81 – 120	1 : 2	15	26 – 34

NOTE:

For the minimum ratio of root system volume to above ground volume, a tolerance of 20% is allowed.

For the proportion of fine root volume in the total root system, a tolerance of 20% in fine root volume is allowed.

No tolerance is allowed for the tap root length.

[a)] Fine roots are roots less than 1 mm in diameter.

[b)] For seedlings and large-size plants, the length of the tap root plus the length of positively geotropically growing branches

[c)] For *Picea abies*, the length of the longest horizontal root