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Original Article

The Form Defects Spectre Frequency in *Acer pseudoplatanus* Populations

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Abstract

Aside quantity, the value of the timber is in tight correlation with its quality as well. The quality of the timber, in living trees, is directly influenced by the site factors, but some attributes are genetically fixed. This proves the importance of genetics and tree breeding in the improvement of the timber quality. By form defects of standing trees it is understood the overcoming of certain limits, established through standards of certain morphometical attributes of the trunk. The importance of defects depends on the wood material's given destination as well.

Keywords: *Acer pseudoplatanus*, stand, biodiversity, ovality; root-swelling, frequency, tree breeding

1. Introduction

The morphometrical attributes of the trees' trunk, like the diameter and height, as well as trunk form, are known by the geneticians to be phenotipical attributes of the trees, because in their forming process the environment, as well as the genotype, take part, in yet unknown proportions.

Based on "Normele tehnice silvice 4" of 2000 ([1], in the case of broad-leaved trees, 75% of the tree's usable timber is stored in the first half of the trunk.

This is why in this paper we will concentrate on the form defects met in the first half of the trunk belonging to the *Acer Pseudoplatanus* species, defects like ovality and root-swelling.

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2. Material and Method

In order to determine the ovality and root-swelling spectre frequency of the *Acer Pseudoplatanus* species, a number of 5 natural stands, that also have the studied species in their composition, were studied. The geographical placement of the studied populations is presented in Table 1.

Inside these populations a number of 50 trees were randomly chosen, the only selection criteria being the distance between trees, of minimum 50 meters. According FAO 2004, it is considered that 50 adult trees, that have no connection between them and they randomly pollinate, are necessary to comprise 99% of the genetic diversity of a population. This way we have 250 evaluated trees in this study [1, 2, 3, 4].

Table 1. Data reffering to the studied populations placement

Current number	Production unit/Landscape planner unit	County	Region of provenance	Geographical location				Total surface (Ha)
				Latitude N	Longitude E	Altitude (m)		
						Minimum	Maximum	
1	5-196	Alba	E1	46^{O}11’	23^{O}10’	730	1100	29,6
2	1-79A	Bistrița-Năsăud	A1	47^{O}15’	24^{O}35’	790	1350	22
3	7-34	Brașov	B1	45^{O}35’	25^{O}33’	750	1000	30,9
4	4-57B	Cluj	E3	46^{O}42’	22^{O}49’	950	1280	21,3
5	1-58	Mureș	F2	46^{O}40’	25^{O}04’	990	1200	43,6

Having the purpose to determine the defects, the selected trees were inventoried, and such two perpendicular diameters at the height of 1.3 meters were measured, and also a diameter at the height of 0.3 meters. Aspects of these measurements are shown in Figs.1 and 2.

The ovality represents the deviation of the transversal section of the trunk from the circular form to an elliptical or ovoidal form, being caused by the unequal activity of the cambium on the trunk’s girth, owing to the rooting system, the asimmetry of crowns, the action of the dominant winds, which lead to different photosynthesis processes [3]. An ovality greater than 8% is not accepted. The ovality was calculated at the trunk’s height of 1.3 meters, by subtracting the lesser diameter from the greater diameter, and then dividing the result by the greater diameter, in the end multiplying it by 100 [1].

$$Ov = \frac{D-d}{D} \text{ x}100$$

Figure 1. Measuring the diameter at the height of 1.3 m

Figure 2. Measuring the diameter at the height of 0.3 m

The root-swelling is the abnormal increasing of the trunk at the root-crow level, on a part of it, caused by the rooting conditions. The root-swellings appear because of the exaggerated growth of the roots of the trees placed on humid and unstable soils, being caused by the resistance towards the trees’ root-rupture of the wind and the efforts pulled when sustaining their own weight [3] This defect is affecting many species and a percentage of 30% is admitted. The root-swelling was calculated by subtracting the diameter at the height of 1.3 meters from the diameter at the height of 0.3 meters, and then divided by the diameter at 0.3 meters, the result then being multiplied by 100 [1].

L = ° x100

The defect spectre frequency was calculated by the formula:

$$F = \frac{n}{N} \times 100$$

n = number of trees presenting the defect
N = total number of accounted trees

3. Results and discussions

Following the processing of the measurements, ovality and also the root-swelling, as well as the spectre frequency are all above the admitted levels. The values of the attributes, minimums, maximums, as well as medium values, are all shown in at the height of 1.3 m in Table 2.

Tab. 2 The values of the studied attributes in the five provenances.

Provence	Oval			Root-swelling		
	Minimum	Maximum	Average	Minimum	Maximum	Average
Alba	0.0	15.4	5.7	10.0	44.1	29.8
Bistrița- Năsăud	0.0	15.8	5.5	0.9	34.8	21.1
Brașov	0.0	18.5	7.5	6.8	46.2	27.1
Cluj	0.0	21.9	6.8	14.1	45.3	28.5
Mureș	0.0	22.1	6.4	12.1	50	25.1

A better highlighting of the variations of the resulted values is presented in Fig. 1 for ovality and in Fig. 2 for root-swelling.

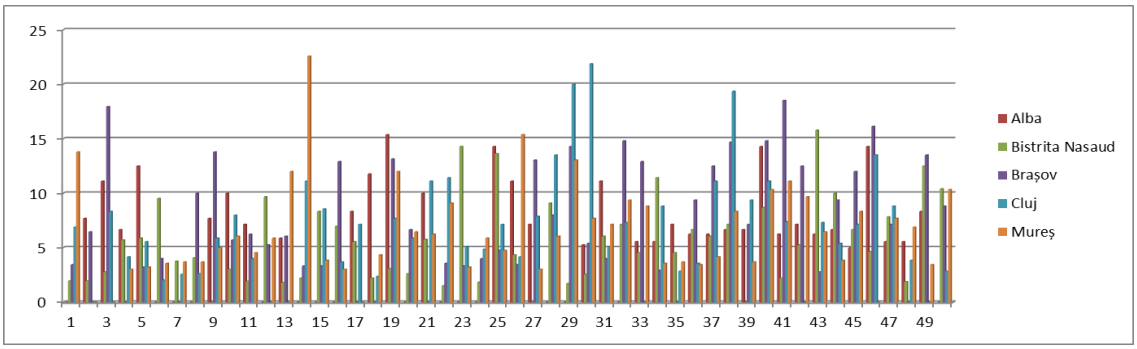

Figure 3. The variation of the ovality in the five studied provenances

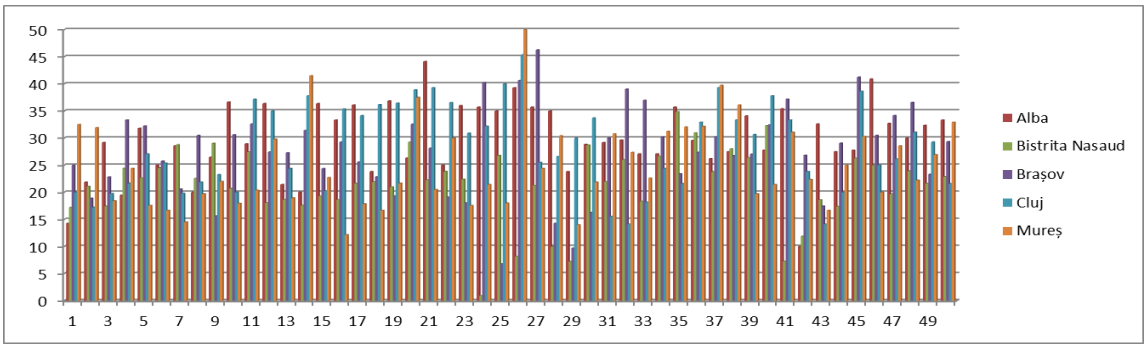

Figure 4 The variation of the root-swelling in the five studied provenances

In order to render the superior value of the timber it is necessary that these defects have a low value, and their spectre frequency inside the populations has to be of reduced value.

So following the calculation of the defects' frequency being above the admitted levels, different values have resulted for all five provenances.

In Table 3 the spectre frequency values are shown above the admitted levels, to render the superior quality of the timber.

Tab 3. The percentage of the defects above the admitted levels

Defects above the permissible limits	Provenance				
	Alba	Bistrița Năsăud	Brașov	Cluj	Mureș
Oval above 8% (%)	22	20	34	28	26
Sprawl over 30% (%)	46	8	26	42	34

4. Conclusions

Although in certain populations these defects have a high degree of appearance, the timber can still be processed, even if not at full capacity, and only for lumber. In order to improve the commercial value it is recommended that the silvotechnic works, with great ameliorating impact on populations, be applied.

This way, especially through thinning, it would follow the elimination of the trees that present these defects above admitted levels. Following the elimination of these trees the passing of the defects by generative way will be stoped, and then defects could only appear as a side effect of the environmental conditions of the populations.

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