RESEARCH ON INDEX PRUNING VARIATION IN THE TURKEY OAK WITHIN THE FOREST BOBOŞTEA (BIHOR COUNTY)

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Abstract

The paper presents results of research on Turkey oak species (Quercus cerris L.) in the sampling areas located in Boboştea Forest (Bihor county) and beyond (Tăşnad Forest district and Dumbrava-Beliu Forest district), which allowed us to draw some conclusions on the their index pruning, but also on the variation of this index based on the biological origin of the trees within the area studied.

Out of total 742 trees we analyzed, index pruning ranges between 0.06 and 0.9 with a mean value of 0.53.

Key words: index pruning, quality class (grade), Turkey oak, Boboştea Forest.

INTRODUCTION

Tree stands as means of production consisting of the same species may differ among themselves by a greater or lesser vegetation force (Leahu I., 2001).

In the trees growth and development after the closing of the crop and making of stand canopy, there are two types of specific morphological changes i.e. stems straightening and pruning (Florescu I., Nicolescu N., 1996).

The process of dropping off or “leaching” of the lower branches and twigs of trees strain is called natural pruning (Negulescu et al., 1973).

This process, which actively contributes to improving the technological quality of trees occurs due to reduced light flow penetrating inside the stand, and which thus becomes insufficient for the branches at the base of the trees crown and causes them to lose their foliage, after which the branches dry, rot and fall. The dynamics of natural pruning is more active in species which are rapidly growing, in tightly closed stands, located in favourable stationary conditions; instead it is slower in the case of species developing slowly in less favourable stationary conditions, in thinned stands regardless the cause, etc. (Florescu I., Nicolescu N., 1996, 1998).

MATERIAL AND METHOD

Research aimed at going in depth with the knowledge of species in our forests (i.e. Turkey oak), knowledge which is relatively rich in terms of their biological characteristics, but rather poor in terms of quality characteristics of forest biomass which they provide (Beldeanu E.C., 1999, 2008).

In order to characterize the quality of the Turkey oak wood in the sampling area we studied (i.e. Boboştea Forest) we placed a total of 14 sample plots, varying in size (ranging between 2000-2400 m^2), where we carried out measurements and observations on a number of 613 Turkey oak samples (***, 1983; 1997). For comparison purposes, two sample plots were placed within Tăşnad Forest district (Satu Mare County), with an area of 2,000 m^2, where we performed measurements and observation of a number of 51 Turkey oak samples, and two sample plots were founded within Dumbrava - Beliu Forest district (Arad County), with an area of 2000 m^2, where we carried out also measurements and observation of a number of 78 Turkey oak samples (***, 2003; 2005). The total number of Turkey oak samples we measured within the 18 sample plots was 742 (Bartha Sz., 2011; Bartha Sz., 2012).

In order to characterize the standing trees (timber), individual description cards (fiches) were drafted for each tree (Dinulică F., 2008, 2009). These cards were filled in the studied sample areas at the same time with the inventory of trees and contained *inter alia* data on some characteristics of the trees-i.e. the stem characteristics such as quality class and index pruning size.

Index pruning (**E**), is given by the ratio between the pruned tree height (without the tree branches), (**he**), and the overall height of the tree (**ht**).

Desktop work consisted of processing and interpreting the data collected in the field; this data was centralized on biological origins and diameter classes (Chitea Gh., 1997; Leahu I., 2004; Dorog S., 2008). Mathematical processing of data was performed in STATISTICA version 8.0 and Excel software.

RESULTS AND DISCUSSION

Shapiro-Wilk test (W) was applied for the quality and size of index pruning of the trees analyzed; the test results presented in the Table 1 below shows that variation of these characteristics do not comply with the normal correctness (distribution normality).

Table 1

Assessment of experimental distribution normality

Tree characteristic	Tree population (number of tress)	Shapiro-Wilk test		Distribution normality
		W	p, %	
Quality class (grade)	742	0.987***	<0.001	No
Index pruning	742	0.980***	<0.001	No

Also, the histograms presented in Fig. 1 and 2 allow us to make the following observations:

● Majority of trees have an index pruning ranging between 0.4 and 0.7 (which explains in part the high share of trees in 2nd Quality class);

● Most numerous trees (i.e. 443 trees), are ranked in the 2nd Quality class, followed by those ranked in 1st Quality class.

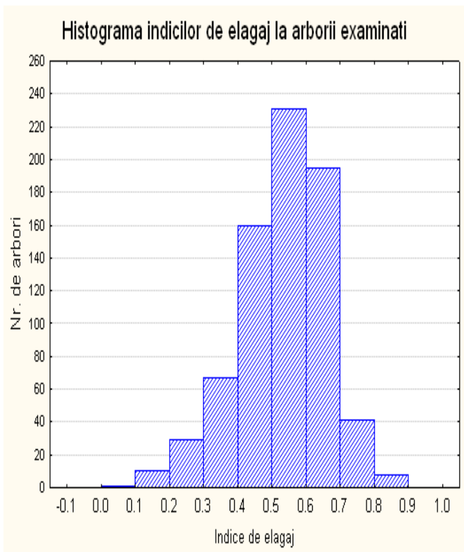

Fig. 1. Histogram of index pruning in trees studied (number of trees/index pruning)

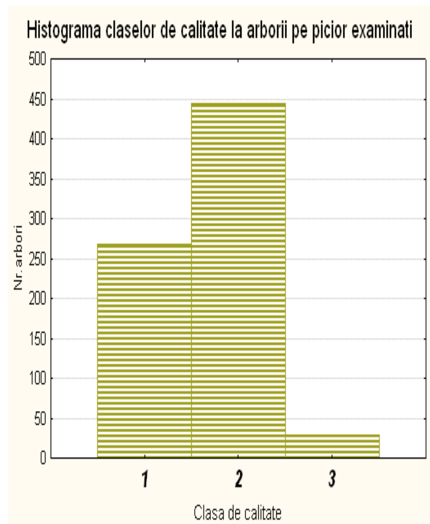

Fig. 2. Histogram of quality classes in standing trees studied (number of trees/quality class)

After the statistical processing of quality index size in the case of standing trees studied there were obtained the statistical indicators presented in Table 2 below.

The coefficient of variation is of special importance in forestry, as it serves to the both biometric characterization of the tree stands, and the characterisation of the physical and mechanical properties of the wood, tree parts. The coefficient of variation value of a specific feature (i.e. height) may alter with age; usually there is a decrease in the coefficient of variation as the stands grow older, which can be explained biologically (Giurgiu V., 1972).

By analyzing the data presented in Table 2 above, one may perceive that a high degree of homogeneity is present in the case of the size of index pruning of trees (coefficient of variation 24%) followed by their quality class (with a coefficient of variation of 32%) and thus highlighting a homogeneous community in terms of the above mentioned characteristics.

Table 2

Statistical indicators of the main trend and dispersion of the qualitative and quantitative characteristics of the statistical tree populations studied

Quantitative characteristics	Tree population volume (number of tress)	Arithmetic mean	Median	Minimum value	Maximum value
Index pruning	742	0.53677	0.55000	0.06000	0.9000
Quality class	742	1.67790	2.00000	1.00000	3.0000
Quantitative characteristics	**Tree population volume (number of tress)**	**Variation**	**Standard deviation**	**Coefficient of variation among trees, %**	**Standard error of arithmetic mean**
Index pruning	742	0.0167	0.12909	24.0495	0.004739
Quality class	742	0.2969	0.54490	32.4754	0.020004

Moreover, from the analysis of the data presented in Table 2 above on statistical indicators of the main trend and the dispersion of quantitative and qualitative characteristics of the trees population studied, the following findings may be issued:

● Index pruning has an mean value of 0.53 (exceeding the mid stem), the maximum value is of 0.9 and the minimum is 0.06;

● Trees quality class is intermediate ranging between 1st class and 2nd class (a mean of 1.6), and the outer quality classes limits range between 1st and 3rd classes.

In order to capture the variations among the biological origins of trees (seed and sprouts) in terms of distribution of certain of defects of the former within the area studied, we used the Kruskal-Wallis non-parametric test to examine the statistical significance of differences.

Thus the statistical significance of the differences between the biological origins of the trees in terms of their quality class/grade shows that the biological origins of the trees represent a **factor of very significant** influence on them (see Table 3 below).

Table 3

Statistical significance of the influence of trees' biological origin on trees' quality class

Result of Kruskal-Wallis test: H=29.19033***, N = 742 Trees, f = 1 Degree of freedom, p<0.1%		
Matrix of transgression probabilities on the individual variations caused by biological origin by trees		
	Seed origin	**Shoot origin**
Seed origin		0.000004
Shoot origin	0.000004	

Also, the biological origins of the trees represent a **factor with statistically insignificant** influence on the index pruning size (see Table 4 below).

Table 4

Statistical significance of the influence of biological origin of trees on the index pruning size

Result of Kruskal-Wallis test: H=2.342365 ns, N = 742 Trees, f = 1 Degree of freedom, p=12.59%		
Matrix of transgression probabilities on the individual variations caused by biological origin by trees		
	Seed origin	**Shoot origin**
Seed origin		0.126035
Shoot origin	0.126035	

The size of the index pruning trees in the studies area is very close to the mean value i.e. 0.52 in case of shoots vs. 0.54 in case of seed with practically no significant difference between the two biological origins.

CONCLUSIONS

● The biological origin of Turkey oak tree (*Quercus cerris* L.) within the studied area is a factor with statistically insignificant influence on the size of index pruning;
● The Kruskal-Wallis nonparametric test shows that the biological origin of trees (seed-shoot) within the studied area is a factor of highly statistically significant influence on their quality classes;
● Samples of seed remain almost in the same percentage in both in the 1st Quality class (20.35%) and the 2nd Quality class (19.27%) when compared with the biological origin from the shoot, amounting to 40.43% in the 2nd Quality class and 15.76% in 1st Quality class;
● The index pruning mean value (0.53) shows that usually the lower half of the stem is pruned and of superior quality.

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