THE DISTRIBUTION OF THE TURKEY OAK (*QUERCUS CERRIS*) TREES DEFECT, ACCORDING TO THEIR CENOTIC POSITION, IN THE CANOPY STANDS FROM BOBOŞTEA FOREST (BIHOR COUNTY)

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Abstract

In the paper we present the results of the research performed on the Turkey oak (Quercus cerris), in the surveying areas located in Bobostea forest (Bihor county) and beyond (Forest District Tasnad and Forest Distric Dumbrava-Beliu), which allowed us to drawn some conclusions regarding the distribution of some external defects of the trees, in the crown layer of the stands, depending on the cenotic position thereof in the surveyed areas.

From a total of 742 trees surveyed, a number of three social classes (Class I, II and III according to Kraft's classification) were found and two external defects (frost crack and sweep) were surveyed and correlated with the classes aforementioned.

Key words: Turkey oak, trees, defects, cenotic position, crown

INTRODUCTION

Light as an ecological factor of primary importance influences the dynamics of the collective processes (regeneration, growth and development, straightening and elongation of trees, phenological advance, natural differentiation and elimination, ecological succession, forest stands, etc.) inside the forest (Marcu, 1983; Florescu, Nicolescu, 1996; Blujdea, 2000; Parascan, Danciu, 2001).

According to some authors (Constantinescu, 1976; Florescu, Nicolescu, 1996), the process of tree differentiation refers to the differences that occur in time between the trees living within a forest habitat. As a consequence of this trees differentiation in the forest, Kraft (1884) differentiated for even-aged stands five classes, by visual assessment of the tree height and position of the tree crowns: class I - predominant trees (the highest ones and with the exceptionally well-developed crowns), class II - dominant trees (height close to the predominant ones but with less developed crowns), class III - co-dominant trees (relatively smaller when compared to the trees of the first two classes and with crowns relatively weakly developed and asymmetrical), class IV - dominated trees, and class V - dead and dying trees.

MATERIAL AND METHOD

In terms of qualitative description of the Turkey oak wood, within the surveyed perimeter (i.e. Bobostea forest) a number of 14 sampling surfaces of variable size (ranging between 2000-2400 m^2) were placed and in which measurements and observations were made for a number of 613 Turkey oak samples (***, 1983; 1997a; 1997b; 1997c). For comparison purposes, two sampling surfaces were established within the Forest District Tasnad (Satu Mare county), sizing 2000 m^2, where a number of 51 Turkey oak samples were measured and observed and other two sampling surfaces were established within the Forest District Dumbrava - Beliu (Arad county), also sizing 2000 m^2, where 78 Turkey oak samples were also measured and observed (***, 2003, 2005). The total number of Turkey oaks trees measured in the 18 sampling areas was 742 (Bartha, 2012).

Fig. 1. Turkey oak sample (*Quercus cerris*),
included in the Class I (Kraft's classification) with frost crack and sweep

In order to characterize the standing timber, records for all the trees identified were prepared and completed (Dinulică, 2008; 2009). The records contain 40 qualitative and quantitative parameters per each tree aforementioned. In order to characterize the parameters, in the present case, the records of these parameters include the presence of sweeps and frost cracks (visually assessed), (Bartha, 2011), (Fig. 1).

The desk research consisted of the processing and interpretation of data collected in the field; these data were centralized by trees' social classes and types of defects (Giurgiu, 1972; Chitea, 1997; Leahu, 2004).

Mathematical data processing was performed in the Statistica (version 8.0) and Excel programs.

To highlight the distribution of the two types of trees' defects (frost crack and sweep), depending on their position in the vertical section of the crown (Kraft classification), we used the Kruskal-Wallis non-parametric H test to review the statistical significance of the differences.

RESULTS AND DISCUSSION

The analysis of the **statistical significance of the Kraft class influence** on the sweep presence (Tables 1 and 2) reveals a **statistically significant distinct influence**, with differences between the trees included in Kraft classes I and II.

Table 1

The distribution of various sweep types of Turkey oak species (*Quercus cerris*), depending on their position in the vertical section of the canopy

Class I Kraft	**Class II Kraft**	**Class III Kraft**
No sweep (406 samples)	No sweep (33 samples)	No sweep (1 exemplar)
Simple sweep (99 samples)	Simple sweep (13 samples)	Simple sweep (1 exemplar)
Double sweep (27 samples)	Double sweep (3 samples)	Double sweep (0 samples)
Multiple sweep (133 samples)	Multiple sweep (24 samples)	Multiple sweep (2 samples)
Total (665 samples)	**Total** (73 samples)	**Total** (4 samples)

Table 2

The statistical significance of the Kraft class influence concerning the sweep presence

Kruskal-Wallis H test results: H=10.01519** , N = 742 trees, f = 2 degree of freedom, p=0.67%			
Transgression probability matrix for the position of the trees in the vertical section of the canopy			
	Class I Kraft	**Class II Kraft**	**Class III Kraft**
Class I Kraft		0.040743	0.518029
Class II Kraft	0.040743		1.000000
Class III Kraft	0.518029	1.000000	

In addition to the above, the histogram showed in Fig. 2 below allows us to issue the following statement:

- In the case of trees included in Class I according to Kraft's classification it is most likely to occur sweeps of different types (simple, double and multiple).

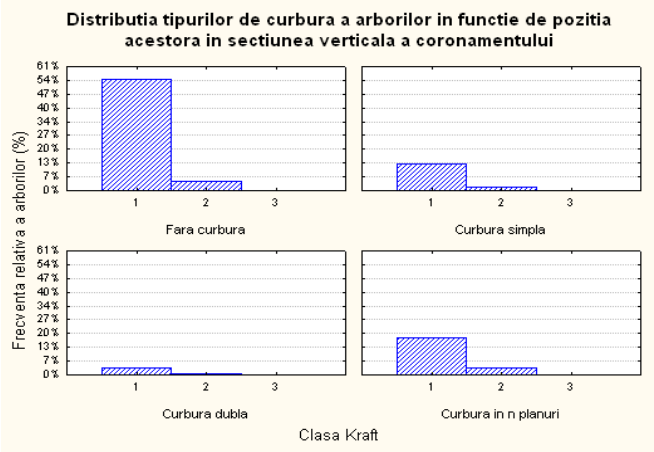

Chart legend translation:
Frecvența relativă a arborlilor - Relative frequence of trees
Fără curbură - No sweep
Curbură simplă - Simple sweep
Curbură dublă - Double sweep
Curbură în n planuri - Multiple sweep
Clasa Kraft - Kraft class

Fig. 2. Distribution of sweeps types of trees
according to their position in the vertical section of canopy

The statistical significance of the trees' Kraft class influence on the **presence of the frost cracks** (Tables 3 and 4) shows that the position of the trees in the vertical section of the canopy is a **factor with a statistically insignificant influence** on this researched parameter.

Moreover, the trees included in the Kraft Class I (Tables 1 and 3) are affected by most defects (different sweeps associated with other defects such as the presence of frost cracks in this case study).

Table 3

The presence of frost cracks of Turkey oak (*Quercus cerris*),
depending on their position in the vertical section of the canopy

Class I Kraft	Class II Kraft	Class III Kraft
No sweep (35 samples)	No sweep (43 samples)	No sweep (3 samples)
Sweep present (307 sample)	Sweep present (30 samples)	Sweep present (1 sample)
Total (665 samples)	Total (73 samples)	Total (4 samples)

Table 4

The statistical significance of the Kraft class' influence on the frost-crack presence

Kruskal-Wallis H test results: H=2.283679 ns, N = 742 trees, f = 2 degree of freedom, p=31.92%			
Transgression probability matrix for the position of the trees in the vertical section of the canopy			
	Class I Kraft	**Class II Kraft**	**Class III Kraft**
Class I Kraft		0.818869	1.000000
Class II Kraft	0.818869		1.000000
Class III Kraft	1.000000	1.000000	

CONCLUSIONS

One may draw the conclusions that **the position of the trees in the vertical section of the canopy (Kraft class)** is a **factor with a distinctly significant influence** on the **presence of sweep** (with differences between the classes I and II Kraft) and statistically insignificant on the presence of the frost crack of the Turkey oak in the surveyed areas.

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