# EXTERIOR NATURAL DEFECTS VARIATION IN SIZE IN THE CASE OF ROUND RAW WOOD IN MARKED TURKEY OAK (QUERCUS CERRIS) IN BOBOŞTEA FOREST (BIHOR COUNTY)

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***Abstract***

*Research aimed at deepening the knowledge of biological species in our forests - in this case the Turkey oak (Quercus cerris) contains relatively rich knowledge in terms of their biological characteristics, but quite poor in terms of qualitative characteristics of forest biomass they provide.*

*Standing timber (trees) are important in that they put their mark on the main characteristics of wood they produce and provide basic data on the quality of the wood, especially to that under placed the influence of defects highlighted during the examination the trunk appearance.*

*Out of a total of three trees felled, by cutting a total of 30 pieces of raw round Turkey oak resulted and they were subject to research in order to identify and quantify their main current exterior defects.*

**Key words**: natural defects, round raw wood, Turkey oak (*Quercus cerris*), Boboştea forest

## INTRODUCTION

In the economic field of wood exploitation one requires a complete and superior utilization of the whole timber exploited and an economic use of each piece of wood, depending on its qualities and the requirements of conversion technologies into products, and the features that it should encompass (Bartha, 2012 Moroşanu, 2011).

Both the standing timber destined for exploitation purposes, and the material resulting from the exploitation are usually very heterogeneous, the cause for that consisting of multiple factors (eg. wood species, various conditions of growth of trees, the characteristics range of individual trees and their timber, the cutting, etc.). Classification of all the aforementioned into categories by size, quality, usage areas, according to current standards, for marketing purposes, is achieved by sorting (Beldeanu, 1999; 2008).

Sorting of the timber exploited is a technical and economic analysis carried out for the purpose of timber distribution into raw wood assortments but also the technological operations involved in obtaining such wood selection (Beldeanu, 2005; 2008).

Assortment of raw wood is a piece of wood, which is corresponding in terms of size, quality, shape and condition to the delivery conditions imposed by beneficiaries (Ciubotaru, 1998).

Sorting the wood of felled trees (according to standards in force) may be carried out based on three criteria as follows: size criterion, quality criterion and use criterion.

In depth knowledge of the both the structure and properties of wood, and the more and more advanced technology used in wood processing industry have all made it necessary the review and continuous improvement of such processes (Beldeanu, 2008).

Over time, the Turkey oak *(Quercus Cerris)* has been considered in our country a controversial species, due to totally different assessment with regard to certain physical, mechanical and technological properties of this wood. Negative feedback, such as: large number of defects (frost-cracks, shakes, strong tendency to crack, the different colour in central part of the timber. etc.) wide sapwood (laburnum), low durability of wood (especially in contact with the ground) were setbacks in the intensification and broadening the scope of use of Turkey oak (Ghelmeziu 1963, quoted by Adam, 2004).

In our country, at present, Turkey oak wood finds its use in different areas (according to Romanian standards in force), such as:

• as **industrial wood** (according to SR 1039 standard: Round wood of Sessile oak, Turkey oak, Hungarian/Italian oak and Turkey oak for industrial use);

• as **wood for boards made of wood chips and boards made of wood fibber** (according to STAS 7149-86 standard: Wood for boards/plates made of wood chips and wood fibber);

• as **structural timber/wood for construction purposes** (STAS 4342-85 standard: round hardwood for construction);

• as **wood for charcoal and as fuel purposes** (STAS 2340-80 standard: cordwood and branches for charcoal and fuel purposes);

• as **wood for railway sleepers** (according to EN 13145 standard: railway applications; railway tracks; wood railway sleepers and bearers).

## MATERIAL AND METHOD

The statistics group comprises a number of three felled trees (Boboştea forest-Bihor county) on the plot/compartment 87D (Management unit VII Boboştea-Forest district Sfânta Maria), (***, 1997a; ***, 1997b), which resulted in a number 30 pieces of Turkey oak round raw wood.

Fig. 1 Turkey oak round raw wood pieces (Compartment 87D, Management unit VII Boboştea-Forest district Sfânta Maria)

Cutting the felled trees was performed as follows: the first piece cut was one meter long, and the remaining parts had two meters long, until one reached the first green branch, thereby achieving a total of 10 cut pieces per tree (see Fig. 1 above).

Identification and quantification of exterior natural defects on the raw round pieces of Turkey oak was accomplished by moving along them, and one was followed the nature, frequency, location, severity of such defects, and the distance between the admitted defects in the assortments of round wood.

For every tree felled, a description sheet was compiled comprising the following elements: origin, total height, pruned height, core diameter, number of pieces of raw round wood resulted and the nature and quantification of natural defects existing in each piece obtained (see Tables 1, 2 and 3 below).

*Table 1*

Description sheet for raw round wood pieces obtained from Turkey oak tree no. 1

| **Tree** no. 1 | **Biological provenience** - sprout | $\mathbf{H_{total}}$ = 29 m | $\mathbf{H_{prunned}}$ = 19 m | $\mathbf{D_{1,3}}$ = 42 cm |
|---|---|---|---|---|
| **No. of raw round wood pieces resulted** = 10 | | | | |
| Piece no. 1 (lenght= **1 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (length: 0.5 m) | | Swelling (12 %) | |
| Piece no. 2 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (length: 2 m) | | - | |
| Piece no. 3 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood (lenght: 1.07 m) | Frost-crack throughout the length of round wood - (lenght: 0.98 m) | | Epicormic branch /sprout (Ø= 5cm) |
| Piece no. 4 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (lenght: 1.82 m | | - | |
| Piece no. 5 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (lenght: 0.48 m) | | | |

| | | | | |
|---|---|---|---|---|
| Piece no. 6 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (length: 1.19 m) | | Frost-crack throughout the length of round wood - (lenght: 0.55 m) | |
| Piece no. 7 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (lenght: 0.76 m) | Frost-crack throughout the length of round wood-(lenght: 0.135 m) | Epicormic branch / sprout (Ø= 7cm) | |
| Piece no. 8 (lenght = **2 m**) | **Exterior defects** | | | |
| | Dead branch (Ø= 9cm) | | - | |
| Piece no. 9 (lenght = **2 m**) | **Exterior defects** | | | |
| | Dead branch (Ø= 8cm) | Dead branch (Ø= 9cm) | Dead branch (Ø= 9cm) | Dead branch (Ø= 3.5cm) |
| Piece no. 10 (lenght = **2 m**) | **Exterior defects** | | | |
| | Epicormic branch / sprout (Ø= 12cm) | Epicormic branch / sprout (Ø= 10cm) | Epicormic branch / sprout (Ø= 9cm) | Epicormic branch / sprout (Ø= 7cm) |

*Table 2*

Description sheet for raw round wood pieces obtained from Turkey oak tree no. 2

| **Tree** no. 2 | **Biological provenience** - sprout | $H_{total}$ = 28 m | $H_{prunned}$ = 19 m | $D_{1,3}$ = 46 cm |
|---|---|---|---|---|
| **No. of raw round wood pieces resulted** = 10 | | | | |
| Piece no. 1 (lenght= **1 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (length: 1.0 m) | | Swelling (14 %) | |
| Piece no. 2 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (length: 2 m) | Frost-crack throughout the length of round wood – (length: 0.8 m) | Frost-crack throughout the length of round wood - (length: 1.2 m) | |
| Piece no. 3 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (lenght: 0.15 m) | | - | |
| Piece no. 4 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (lenght: 2.0 m) | Frost-crack throughout the length of round wood - (lenght: 1.2 m) | Undercovered knot (Ø= 100 mm) | |
| Piece no. 5 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (lenght: 2.0 m) | | Undercovered knot (Ø= 110 mm) | |
| Piece no. 6 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (length: 2.0 m) | Undercovered knot (Ø= 120 mm) | Undercovered knot (Ø= 140 mm) | Epicormic branch /sprout (Ø= 2cm) |
| Piece no. 7 (lenght = **2 m**) | **Exterior defects** | | | |
| | Undercovered knot (Ø= 100 mm) | Undercovered knot (Ø= 110 mm) | Simple sweep (2.5%) | |
| Piece no. 8 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (length: 0.5 m) | Simple sweep (2.0%) | Dead branch (Ø= 6 cm) | |
| Piece no. 9 (lenght = **2 m**) | **Exterior defects** | | | |
| | Epicormic branch / sprout (Ø= 2 cm) | Epicormic branch / sprout (Ø= 4 cm) | Epicormic branch / sprout (Ø= 3 cm) | |
| Piece no. 10 (lenght = **2 m**) | **Exterior defects** | | | |
| | Undercovered knot (Ø= 120 mm) | Epicormic branch / sprout (Ø= 4 cm) | Simple sweep (4%) | |

Desktop work consisted in the processing and interpretation of data collected from the field word and the mathematical data processing was carried out by means of Excel software.

*Table 3*

Description sheet for raw round wood pieces obtained from Turkey oak tree no. 3

| **Tree** no. 3 | **Biological provenience** - sprout | $\mathbf{H_{total}}$ = 29 m | $\mathbf{H_{prunned}}$ = 21 m | $\mathbf{D_{1,3}}$ = 46 cm |
|---|---|---|---|---|
| **No. of raw round wood pieces resulted** = 10 | | | | |
| Piece no. 1 (lenght= **1 m**) | **Exterior defects** | | | |
| | Swelling (12%) | | | |
| Piece no. 2 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (length: 2 m) | | - | |
| Piece no. 3 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood (lenght: 1.1 m) | Frost-crack throughout the length of round wood - (lenght: 0.95 m) | | Epicormic branch/sprout (Ø= 1 cm) |
| Piece no. 4 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (lenght: 1.8 m) | | - | |
| Piece no. 5 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (lenght: 0.5 m) | | | |
| Piece no. 6 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (length: 1.1 m) | | Undercovered knot (Ø= 12 cm) | |
| Piece no. 7 (lenght = **2 m**) | **Exterior defects** | | | |
| | Frost-crack throughout the length of round wood - (length: 0.5 m) | | Epicormic branch / sprout (Ø= 3 cm) | |
| Piece no. 8 (lenght = **2 m**) | **Exterior defects** | | | |
| | Dead branch (Ø= 9 cm) | | - | |
| Piece no. 9 (lenght = **2 m**) | **Exterior defects** | | | |
| | Dead branch (Ø= 8cm) | | Dead branch (Ø= 8cm) | |
| Piece no. 10 (lenght = **2 m**) | **Exterior defects** | | | |
| | Dead branch (Ø= 8 cm) | Dead branch (Ø= 12 cm) | Epicormic branch / sprout (Ø= 5 cm) | Epicormic branch / sprout (Ø= 7 cm) |

**RESULTS AND DISCUSSIONS**

Analyzing data collected and quantified by types of defects for each piece of raw round wood round, one may draw the following conclusions:

For the pieces of raw round wood from the tree no. 1 (see Table no. 1 above):

• 7/10 (70%) of analyzed pieces are affected by frost-crack;

• On a classification scale in terms of in the frost-cracks length (Class I < 0.5 m, Class II = 0.5-1.0 m, Class III = 1.0-1.5 m and Class IV = 1.5-2.0 m) Class I and II frost-cracks prevail with 3 frost-cracks per each class) followed by frost-cracks in the classes III and IV (with 2 frost-cracks per each class);

• From the total number of 7 pieces affected by frost-cracks, it results an average of 1.42 frost-cracks/piece affected (10 frost-cracks/7 wood pieces);

• The other visible exterior defects are the epicormic branch/sprout (20%) and dead branches (20%);

• Analyzing the chart above, it can be noticed that tree felled and cut down is full of frost cracks throughout a length of 13 m (see Fig. 2 above);

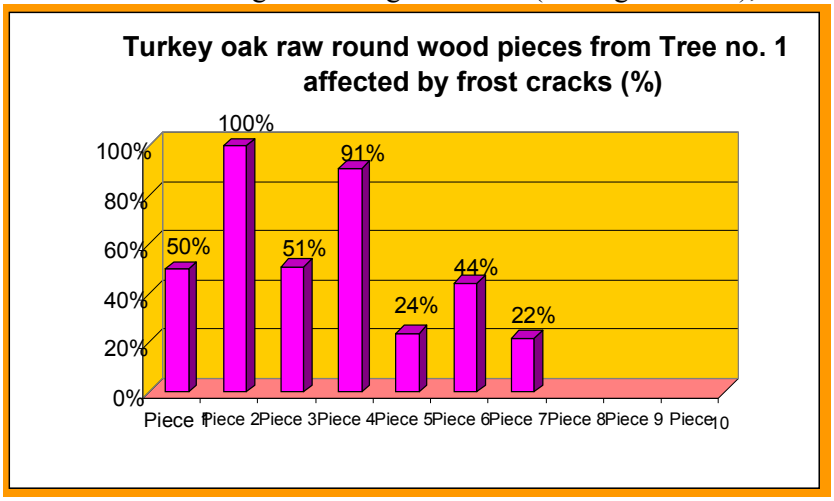


Fig. 2 Turkey oak raw round wood pieces from Tree no. 1 affected by frost cracks

• In the case of the pieces of raw round wood from the Tree no. 2 (see Table no. 2 above):
• 7/10 (70%) of analyzed pieces are affected by frost-crack;
• On a classification scale in terms of in the frost-cracks length, Class IV frost cracks are dominant (i.e. 5 frost crack per class) followed by frost-cracks in the classes III and I (with 2 frost-cracks per each class) and Class II (one frost crack per class);
• From the total number of 7 pieces affected by frost-cracks, it results an average of 1.42 frost-cracks/piece affected (10 frost-cracks/7 wood pieces);
• From the chart above (Fig. 3), it can be noticed that the tree felled and cut is full of frost cracks throughout a length of 11 m;
• The other visible exterior defects are swelling (14%), undercovered knots (7 knots / 5 pieces) with a diameter ranging between 100-140 mm, followed by simple sweeps with values ranging between 2-4%, and epicormic branches / sprouts (5 epicormic branches / sprouts per 3 pieces) with diameters ranging between 2-4 cm and dead branch with a diameter of 6 cm.

In the case of the pieces of raw round wood from the Tree no. 3 (see Table no. 3 above):
• 6/10 (60%) of analyzed pieces are affected by frost-crack;
• On a classification scale in terms of in the frost-cracks length, Classes I, III and are dominant (i.e. 2 frost crack per each class) followed by frost-cracks in the Class II (with one frost-cracks per class);

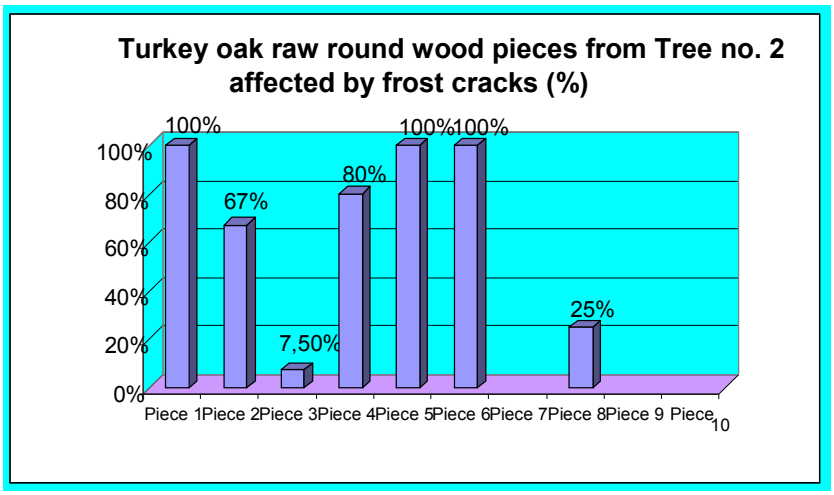


Fig. 3 Turkey oak raw round wood pieces from Tree no. 2 affected by frost cracks

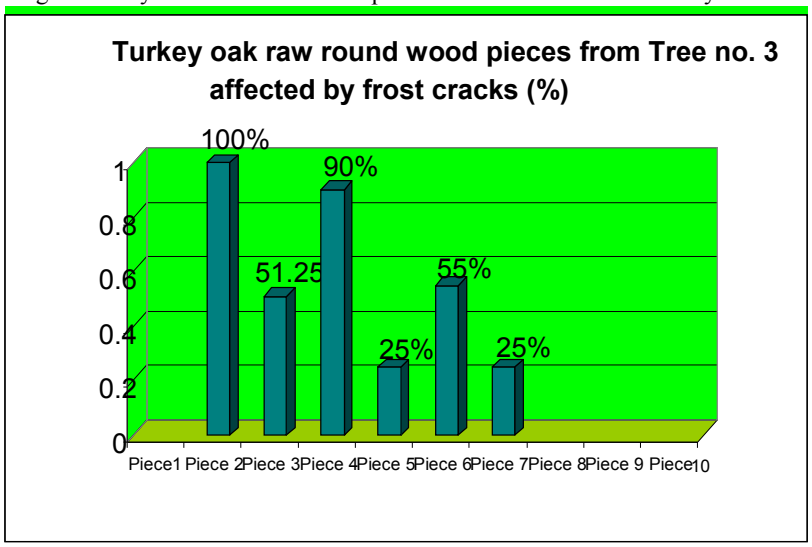


Fig. 4 Turkey oak raw round wood pieces from Tree no. 3 affected by frost cracks

• From the total number of 6 pieces affected by frost-cracks, it results an average of 1.16 frost-cracks/piece affected (7 frost-cracks/6 wood pieces);
• From the chart above (Fig. 4), it can be noticed that the tree felled and cut is full of frost cracks on a length ranging between 1-13 m (see Fig. 4 above);
• The other visible exterior defects are: epicormic branches / sprouts (4 epicormic branches / sprouts) with a diameter ranging between 1-7 cm on 3 pieces, followed by dead branches (5 dead branches/3 pieces) with a variable diameter ranging between 8-12 cm, and a swelling of 12% and an undercovered knot with a diameter of 120 mm.

## CONCLUSIONS

• Turkey oak raw round wood pieces (i.e. 30 pieces) subject to our research are affected by a number of 6 exterior natural defects (frost-cracks, swellings, simple sweeps, undercovered knots, dead branches and epicormic branches/sprouts);
• The most common defects in terms of frequency of occurrence in the case of wood pieces analyzed are: frost-cracks (67%), epicormic branches/sprouts (27%), undercovered knots and dead branches (20%), followed by swellings and simple sweeps (10%);
• Out of the total number of 27 frost-cracks that occurred on the 20 pieces of Turkey oak raw round wood, 7 are Class I frost-cracks (length <0.5 m), 5 are Class II frost-cracks (a length ranging between 0.5-1.0 m), 6 are Class III (a length ranging between 1.0-1.5 m) and 9 are Class IV (length ranging between 1.5 - 2.0 m);
• Wood qualitative downgrading considering only frost cracking is important to follow because this defect influences a share of 67% of Turkey oak raw round wood pieces analyzed, with all the burden of negative consequences in terms of subsequent superior use of the wood.

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