# TECHNOLOGICAL CONSUMPTIONS IN CUTS AT THE FELLING OF BEECH TREES

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#### Abstract

In this paper are analyzed the technological consumptions, that occur in cuts at the felling at beech trees. Felled trees of beech were analyzed in terms of base diameter and cut surface. The cut surface was determined previous using photo images of the stump and notch. For the determination of the technological consumptions it was measured also the cut width for four different sharpening angles.

Key words: consumptions, angle, cut surface, beech, felling.

# INTRODUCTION

Technological consumption are defined by Ciubotaru A., (1998), as those quantities of wood that are lost in the production process because of the specific operations of trimming and wood movement, the obligation to insure working conditions impose by the work safety or as a result of environmental factors actions.

The technological consumptions that are recorded at the trees felling and sectioning are: consumption in cuttings, consumption in ruptures, consumption in oversize and consumption in rotten wood (\*\*\*, 2009).

Technological consumption recorded for the cuttings includes the volume of lost wood in the form of notch, chips and sawdust, wood that is consumed in the execution of timber felling cuts (Oprea I. and Sbera I., 2000).

The interest manifested for beech is justified by the fact that exploitation of beech trees, present some particularities and also because beech is a species with an important economic value (Milescu I., et al. 1967).

The recommended dimensions for the stump felling elements are presented by Oprea I. and Sbera I. (2003), and any exceeding of those dimensions leads to higher technological consumptions.

Regarding the notch height Oprea I. and Sbera I. (2003), presents the effect of this height on the falling tree (figure 1), recommending limiting the notch height to maximum 15 cm, a higher notch leading to an unnecessary consume of wood.



Fig. 1 The effect of notch hight on the falling trees

According to the owner's manual for Stihl 039, properly notch must be cut down at approximately 45° angle and to a depth of about 1/5 to 1/4 of trunk diameter.

For the same purpose, meaning the reduction of technological consumptions, Oprea I. and Sbera I. (2003), advise that the cutting from the opposite side should be executed horizontally, above the inferior plan of the notch, to a height of 1/20 from the tree diameter, at hardwood species, and 1/10 from the tree diameter at softwood species.

Another recommendation made by Oprea I. and Sbera I. (2003), is that at the felling of thick trees, the notch should be located in the stump and not in the trunk, thus reducing the consume of valuable wood.

The technological consumptions of wood at felling trees were determined for softwood and hardwood species (Botezat T. and Achimescu C., 1972). This consumptions were studied also by Pavelescu I. (1972).

The total cut surface at felling trees was determined previous by Enache L. N. and David E. C. (2011) and now we use that surface for the determination of the total volume of technological consumption in this operation. However for the determination of the technological consumptions volume we need to determinate the cut width.

For the present paper were studied three beech cutting areas located in The Upper Basin of Ialomita River, belonging to U.P I Vulcana.

#### MATERIAL AND METHODS

The cut surface was determined by digitizing images of stump and notch, using AutoCAD Map. The photos were taken from an approximately perpendicular position, determining the scale with the help of a forest caliper that appears in every photo (Enache L. N. and David E. C., 2011).

To determine the cut width, we considered several values for the sharpening angles, the chainsaw used was a model of Stihl 039.

For each angle was measured the width of the cut, using a digital caliper (figure 2). The wood used was round wood of beech trees, with diameter larger than 20 cm.

The width of the cut was measured for each angle, while we cut approximately the same surface meaning 80000 cm<sup>2</sup>.



Fig. 2 The digital caliper used to measure the width of the cut.

## **RESULTS AND DISCUSSION**

To determine the cut surface of wood, as can be seen in figure 3, there were analyzed 261 beech trees, with breast height diameters between 22 cm and 92 cm.

Analyzing the distribution of analyzed trees we can observe that all the diameter categories are well covered.



Fig. 3 The distribution of analyzed beech trees on diameter categories

In table 1, we can see the average values of the depth of cut for the four sharpening angles taken in consideration and also the total average value, that will be used to determine the technological consumptions in cuts at the felling of beech trees.

Table 1

The width of cut depending on sharpening angle

Sharpening	25	30	35	40	Average
angles (°)					
Width of	0,866	0,924	0,882	0,852	0,881
cut (cm)					

Next, the volume of wood representing the technological consumptions in cuts at the felling of beech trees, was determined by multiplying the cut surface with the average width of cut.

The distribution of the technological consumptions in cuts at the felling of beech trees, on diameter categories is presented in figure 4.



Fig. 4 Technological consumptions in cuts at the felling of beech trees

## CONCLUSIONS

Analysis of data regarding the technological consumptions in cuts at the felling of beech trees, leads to the following conclusions:

- The lowest value for the technological consumptions in cuts at the felling of beech trees, would be recorded if the sharpening angle used had been the 40° angle.
- The highest value for the technological consumptions in cuts at the felling of beech trees, would be recorded if the sharpening angle used had been the 30° angle.
- The value for the technological consumptions in cuts at the felling of beech trees and not only is influenced also by other factors related to the chainsaw condition.
- The values for the cut width, respectively the values for the technological consumptions may be different for other type of chainsaw.

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