NON-WOOD FOREST PRODUCTS FROM CLUJ COUNTY

Raluca-Elena ENESCU[1*], Emilia VECHIU[1], Diana VASILE[1]

[1"]Marin Drăcea" National Institute for Research and Development in Forestry, Braşov-, Romania
No. 13 Cloşca Street, Braşov-500040, Romania, raluk.enescu@yahoo.com

Abstract. *From the oldest times, the forest has been an important source of both wood and non-wood products for all population categories, the life of some communities even depending on this source. Besides wood products offered by forests, the most popular categories of non-wood products are mushrooms, forest fruits, medicinal plants and wild species. Romania, due to the high variety of forests and of the site condition, has an enormous potential of the categories of non-wood products mentioned above. The aim of this paper is to study the non-wood forest products (NWFP) from Cluj county and to highlight the most important products from this county. Thus, eight type of non-wood forest products were selected from four categories: mushrooms, tree products, understory plants and animal origin products. The analysis of these products was made after a set of 19 criteria to determine the importance of each. After the analyses the most important non-wood forest products from Cluj county were that of animal origin and the less important was fruits from Crataegus sp.*

Keywords: *Cluj county, non-wood forest products, animal origin products.*

INTRODUCTION

The definition of non-wood forest products (NWFP) in vision of Food and Agriculture Organization of United Nation (FAO) is *"goods of biological origin other than wood derived from forests, other wooded land and trees outside forests*,, (www.fao.org). IUFRO calls this products as being ''minor forest products,, and includes in this group products like medicinal and aromatic plants, edible plants, forest fungi, resin and gums (www.iufro.org).

Always, the forest has provided to local communities food, medicines, and income from trading with it products (TAYLOR, 1999). In 1999, Anderson *et al.* specifies that interest for NWFP has started to increase over the last 15 years as a result of the promotion of the economic performance of the forest. The maximum of interest was recorded around the 1990s when NGOs started creating programs to support commerce with these products, researchers began research activites to assess the potential of these products category, and skeptics said that they would not be sustainable (SHACKLETON *ET AL.*, 2011).

In Romania the main non-wood forest products that are subject of commercial activities are represented by forest fruit, edible mushrooms, game species and medicinal plants (MAN AND FUNAR, 2011). Romania has an enormous potential in harvesting these product categories due to the high variability of environmental conditions (ENESCU *ET AL*., 2017), the area of the Romanian forest fund being 7046056,011 ha (www.roifn.ro).

The aim of this paper is to highlight the value of non-wood forest products from Cluj county. Cluj county is located in central-west part of Romania and in the center of Transylvania (figure 1) and it has an area of 6674 km^2 (www.wikipedia.org). The forest fund from this county occupy 162688 ha in 2015 (www.insse.ro) that mean 1626,88 km^2 namely 24,37% from total area of this county.

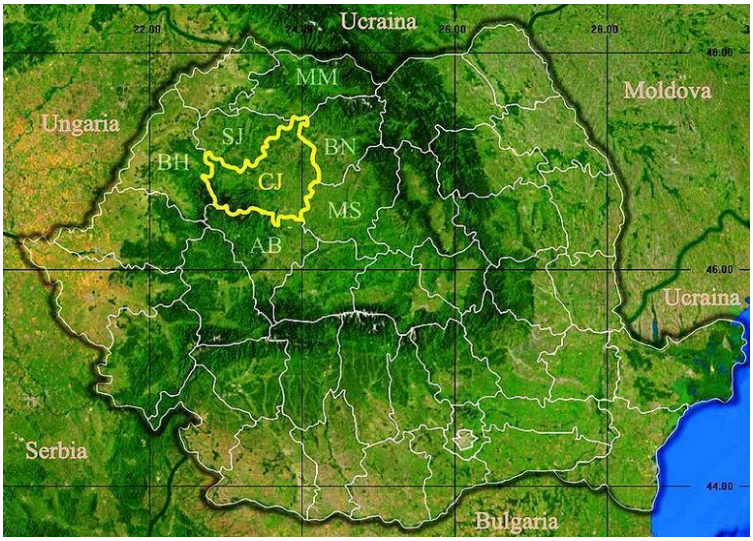

Figure 1. Location of Cluj county (source: www.wikipedia.com)

The most important NWFP from Cluj county are edible mushrooms (*Armillaria* ssp., *Chantharellus cibarius*), tree products (*Tilia* spp.- flores), understory plants (*Rosa* ssp., *Crataegus* ssp., *Mentha* ssp.), game species (*Sus scrofa*, *Capreolus capreolus*). Concerning the hunting game species, the approved harvest quotas for Cluj county in the 2016-2017 season for the two species mentioned above are 1076 wild boar and 908 roe deer (www.mmediu.ro). As regards the other product categories, FD Cluj has the potential to harvest 18 tons of honey fungus and 20 tons of Chantherelle (Vasile *et al.*, 2017), 15 t of Tilia flowers and 1 t peppermint (VASILE *ET AL.*, 2015), 50 t hawthorn and 200 tons of roseberries (VASILE *ET AL.*, 2016).

MATERIAL AND METHODS

The aforementioned products were selected following the analysis of the forest management plans and the harvest quota for hunting approved by the ministry of the county Cluj. Also, for selecting these products, we have recourse to Analytic Hierarchy Process (AHP) which was development by Thomas Saaty and being a multi-criteria decision analysis. The four categories of NWFP mentioned in introduction was design in the European project COST Action FP1203 and also were used in similar studies conducted in other counties from our country. To establish the value nominated product were taken into consideration 19 crieria: harvesting period, portfolio of derived products, harvested quantity by one worker in 8 hours, harvesting cost, knowledge for recognition, knowledge for harvesting, tools needed for harvesting, complexity of harvesting process, distribution range, market potential, the price of raw product, the price of the derived product, transport from the harvesting point to the storage center, perishability, "celebrity" of the product on the market, market demand, biotic threats, abiotic threats and development of the process of harvesting (ENESCU, 2017). For the analyses was used Expert Choice Desktop (v. 11.5.1683) software package.

RESULTS AND DISCUSSIONS

For the 8 selected non-wood forest products (mentioned in introduction) was performed the AHP alternative ranking with 19 criteria, based on opinion of experts (table 1).

Table 1

AHP alternative ranking

Criterion	Mushrooms		Tree products	Understory plants			Animal origin	
	Honey fungus (*Armilaria* spp.)	Chanterelle (*Chantharellus cibarius*)	Tilia flowers (*Tilia* ssp.)	Roseberries (*Rosa* spp.)	Howthorn (*Crataegus* ssp.)	Peppermint (*Mentha* ssp.)	Wild boar (*Sus scrofa*)	Roe deer (*Capreolus capreolus*)
1	3	2	4	8	7	6	5	1
2	6	5	1	2	3	4	8	7
3	7	3	8	5	4	6	1	2
4	3	6	4	5	2	1	7	8
5	7	8	3	5	6	1	4	2
6	4	5	6	3	2	1	7	8
7	5	4	6	2	3	1	7	8
8	3	2	6	5	4	1	8	7
9	3	2	1	5	4	8	7	6
10	7	8	4	3	1	2	6	5
11	5	6	1	4	2	3	7	8
12	6	5	1	4	2	3	7	8
13	5	6	1	4	2	3	8	7
14	8	7	4	1	2	3	5	6
15	6	2	7	3	1	8	5	4
16	5	8	6	2	1	3	7	4
17	6	5	4	1	2	3	7	8
18	7	8	6	5	4	3	1	2
19	6	5	4	3	2	1	8	7

Looking at criterion number 10 (market potential) can be seen that the highest potential is for mushrooms and the lowest potential is for understory plants. Regarding the market demand (crierion 16) the most requested products are mushrooms and animal origin products and the least required products are the understory plants. This situation is directly proportional with criterion 2 (portofolio of derived products) where the most products are made of animal origin products and of mushrooms.

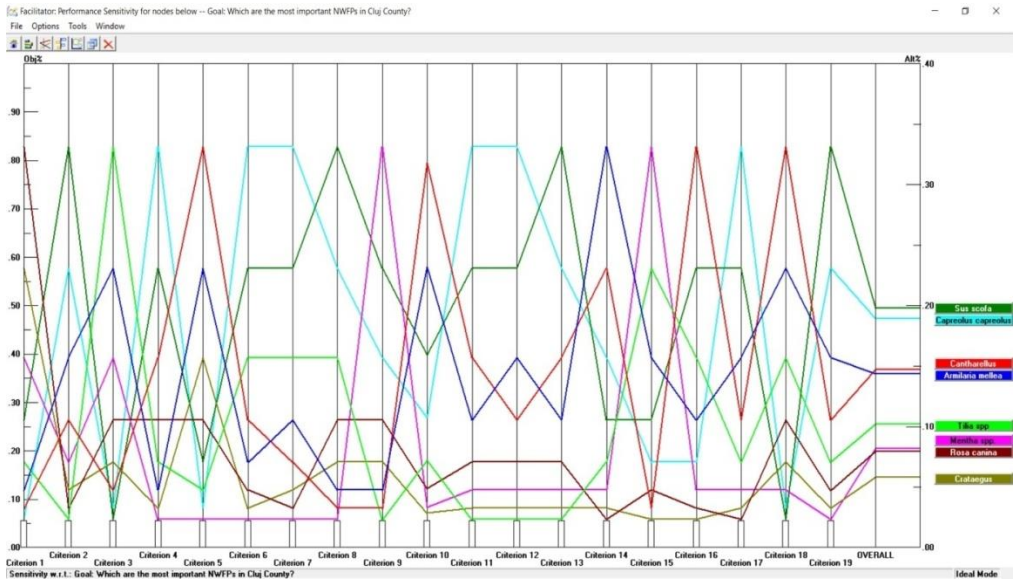

Figure 2. The ranking of NWFPs from Cluj county

Taking into account the AHP (Analytic Hierarchy Process) results in Cluj county the most important non-wood forest products are the animal origin products (wild boar – first place and roe deer – second place), followed by edible muschrooms (Chanterelle and honey fungus) (figure 2). The last place is occupy of *Crataegus* ssp. According to Annex 2 of the Order of the Minister of Environment, Waters and Forests no. 951/2016 the 2016-2017 harvest quota of Romania for wild boar was 37,726, out of which 1076 pieces in Cluj (www.mmediu.ro). This quota from Cluj County represents 2,85% of the quota set at national level. For roe deer species, which ranked on second place, harvesting quota in the same season was 23059 pieces at national level and 908 pieces for Cluj county (www.mmediu.ro). In this county quota for roe deer represents 3,93% from total national quota.

The wild boar is common species for both hunting games and food (SALES AND KOTRBA, 2013). In Europa the main game meat is wild boar meat which is mostly eat by hunters and their family, but it start to develop a specialized market (www.nwfps.org). The wild boar meat is a meat with a low content of lipid, but with a hight content of proteins (GAVRILĂ, 2015). The wild boar trophy is represented by the tusk, fur and hair of the beard (ȘELARU, 1995). A study conducted in 2012 showed that the meat of roe deer ``has a specific, but very good eating quality`` (DASZKIEWICZ *ET AL.*, 2015). The roe deer trophy is given of horns with the whole skull or only parts of it (COTA *ET AL.*, 2008). Chantharelle is o very popular species of edible muschrooms in Europe and it are very rich in vitamin A and D (DREWNOWSKA AND FALANDYSZ, 2015). Also, some researchers consider that this species has even medicinal properties like treatment of respiratory tract diseases (DULGHER *ET AL.*, 2004).

CONCLUSIONS

The most popular non-wood forest products in Cluj county are the animal origin products (wild boar and roe deer). Third and fourth places are occupy of edible mushrooms (chantharelle and honey fungus). Forest occupies almost a quarter from the total area of the county and because of this the forest products are well done represented.

Judging after market potential the first place belongs of edible mushrooms followed of animal origin products. This criterior is in the concordance with market demand which refers exactly to the same two product categories.

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