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WHICH ARE THE MOST IMPORTANT NON-WOOD FOREST PRODUCTS IN THE CASE OF IALOMIȚA COUNTY?

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Abstract

Non-wood forest products (NWFPs) represent a veritable resource base for development, providing income to support livelihoods and promoting the competitiveness of rural economies. In Romania, NWFPs are mainly represented by forest fruits, mushrooms, game, and medicinal plants, with a total of almost 350 species of interest. Across the country the distribution of NWFPs is not uniform, being dependent on forests. The goal of this paper was to highlight the most important NWFPs for Ialomița County. Therefore, four categories of NWFPs were selected and 19 criteria were used. The Analytic Hierarchy Process (AHP) was used in order to systematically evaluate both quantitative and qualitative criteria and to assess the performance of selected alternatives (i.e. NWFPs) by means of pairwise comparisons. The analyses were carried out by the aid of the Expert Choice Desktop software. Black locust honey was the most promising non-wood forest product for Ialomița County when all the 19 selected criteria received an equal importance.

Key words*: non-wood forest products, NWFPs, Ialomița, AHP.*

INTRODUCTION

Non-Wood Forest Products (NWFPs) are defined as goods of biological origin other than wood, derived from forests, wooded lands and trees outside forests (FAO, 1999). NWFPs are also known as non-timber forest products, wild products, natural products, non-timber forest and grassland products, etc. (Belcher, 2003).

Worldwide, and especially in developing countries, NWFPs represent a real resource base for regional and rural development (Stryamets, 2012), providing support for forest-dependent communities in terms of food, medicine and income (Chupezi et al., 2009), but data availability regarding the harvesting, management and use of NWFPs is scarce (Turtiainen and Nuutinen, 2011). In the last two decades, the importance of NWFPs increased, both for forest owners as for the general public (Mittelman et al., 1997; Janse and Ottitsch, 2005; Keča et al., 2013), around 150 NWFPs being important within international trade (Michie et al., 1999; Schvidenko et al., 2005).

In Europe, NWFPs play an important role in providing income to support livelihoods, maintaining old traditions and promoting the competitiveness (Nichiforel, 2014).

In Romania, NWFPs are mainly represented by forest fruits, mushrooms, game, honey, and medicinal plants (Beldeanu, 2008; Man and Funar, 2011). There is a large variety of NWFPs, which could be classified according to different criteria. For example, NWFPs are used in: food industry (fruits, seeds, mushrooms, sap), chemical industry (resins, bark, cones, leaves), handicraft industry (cetin, cones, Christmas trees), livestock industry (seeds, grasses), pharmaceutical industry (fruits, seeds, mushrooms, medicinal plants). A special category consists in game species. According to Law 407/2006, in Romania, hunting is permitted for 18 species of mammals and 39 species of birds.

Recently, in December 2016, on the website of the Ministry of Environment, Waters and Forests was posted, for public consultation, a project of a Ministerial Order regarding the instructions for harvesting and purchasing the non-wood forest products, specific to national forest fund (MEWF, 2016a). According to this document the list consists in 120 mushroom species and 171 plants (herbaceous, shrub and tree species). In total, there are almost 350 species of interest for harvesting and commercialization as NWFPs.

Across the country the distribution of NWFPs is not uniform, being dependent on forests. As a consequence, counties such as Suceava, Caraș-Severin, Hunedoara, Covasna and Neamț have a higher potential for harvesting and marketing of NWFPs. In contract, the counties from southern and southeastern Romania, for which the forested area represents between 4 and 10% from the total county' area, are characterized by lower degrees of harvesting and marketing of NWFPs. The goal of this paper was to highlight the importance of non-wood forest products in Ialomița County.

MATERIALS AND METHODS

Ialomița is a County situated in southern-eastern part of Romania, in Muntenia region, with the capital city at Slobozia (Figure 1). Its climate is characterized by an accentuated variability (Zaharia et al., 2007) and its woody vegetation is poorly represented, with only 26,200 hectares (INS, 2016).

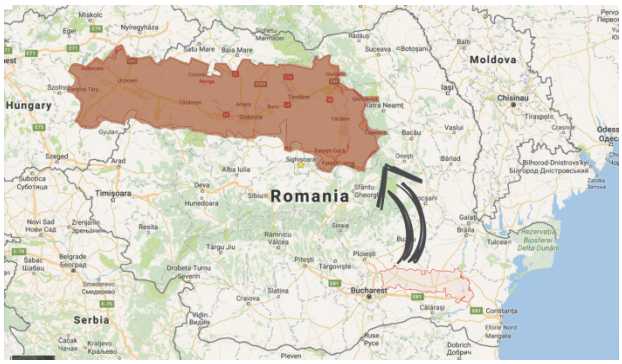

Figure 1. Ialomița County

The forests from Ialomița County are managed by Ialomița Forestry Department (22,123 ha state-owned and 3,136 ha private-owned) and they consists in deciduous forests (99.78%), dominated by pedunculate oak (*Quercus robur* L.), white poplar (*Populus alba* L.), willows (*Salix* spp. L.), European ash (*Fraxinus excelsior* L.) and black locust (*Robinia pseudoacacia* L.). Ialomița Forestry Department has three forest districts, namely Urziceni, Fetești and Slobozia. The forest management plans of the three above-mentioned forests districts were used to do the list of the most important NWFPs.

In order to determine the most promising NWFPs for Ialomița County, in various scenarios, an Analytic Hierarchy Process (AHP) was performed. AHP is a multi-criteria decision analysis that was developed by Thomas L. Saaty in the 1970s, being based on a theory of measurements through pairwise comparisons (Saaty, 2008). Within AHP, the decision problem (i.e. the goal of this study) is decomposed into a hierarchy sub-problem (i.e. the 19 criteria) which can be independently and deeply analyzed. The next step consist in systematically evaluation of the elements (i.e. the 8 selected NWFPs) by comparing them to each other two at the time, by taking into consideration their impact on an element above them in the constructed hierarchy (i.e. the 19 criteria).

Four NWFPs categories were used, i.e. *Mushrooms*, *Understory plants*, *Tree products* and *Animal origin* and for each category the most promising two NWFPs were selected. These categories were designed in the European project COST FP1203: *European Non-Wood Forest Products (NWFPS) Network*. In order to achieve the goal, the following 19 criteria were taken into consideration: Criterion 1: *Harvesting period* (1: the shortest harvesting period … 8: the longest harvesting period); Criterion 2: *Portfolio of derived products* (1: the smallest number of deriver products … 8: the highest number of derived products); Criterion 3: *Harvested quantity by one worker in 8 hours* (1: the lowest quantity … 8: the highest quantity); Criterion 4: *Harvesting cost* (1: the lowest cost … 8: the highest cost); Criterion 5: *Knowledge for recognition* (1: most recognizable product … 8: hardest recognizable product); Criterion 6: *Knowledge for harvesting* (1: the less knowledge necessary … 8: most knowledge necessary); Criterion 7: *Tools needed for harvesting* (1: the least … 8: the more); Criterion 8: *Complexity of harvesting process* (1: lowest … 8: highest); Criterion 9: *Distribution range* (1: lowest … 8: highest); Criterion 10: *Market potential* (1: low … 8: high); Criterion 11: *The price of raw product* (1: lowest … 8: highest); Criterion 12: *The price of the derived product* (1: lowest … 8: highest); Criterion 13: *Transport from the harvesting point to the storage center* (1: the most easy … 8: the most complicated); Criterion 14: *Perishability* (1: lowest … 8: highest); Criterion 15: *"Celebrity" of the product on the market* (1: the least known … 8:

the most popular); Criterion 16: *Market demand* (1: lowest … 8: highest); Criterion 17: *Biotic threats* (1: the fewest threats … 8: the most threats); Criterion 18: *Abiotic threats* (1: the fewest threats … 8: the most threats); Criterion 19: *Development of the process of harvesting* (1: undeveloped … 8: extremely developed).

The following five scenarios, randomly conducted, were taken into consideration: **Scenario 1**: all 19 criteria have equal shares (5.26%); **Scenario 2**: Criterion *Portfolio of derived products* had 21.7% and the remaining 18 criteria had 4.3% each; **Scenario 3**: Criteria *Portfolio of derived products* and *The price of the derived product* with 22% and the remaining criteria with 3.3% each; **Scenario 4**: Criteria *Portfolio of derived products*, *The price of the derived product* and *Harvested quantity by one worker in 8 hours* with 16-20% and the remaining criteria with 3% each; **Scenario 5**: Criteria *Portfolio of derived products*, *The price of the derived product*, *Harvested quantity by one worker in 8 hours* and *Market demand* with 13-18% and the remaining criteria with 2-3% each. The analyses were conducted by the aid of Expert Choice Desktop (v. 11.5.1683).

RESULTS AND DISCUSSIONS

The selected 8 NWFPs, two for each of the four category, according to the data from the forest management plans, are the following: the peppery milk-cap (*Lactarius piperatus* L.) and the honey fungus (*Armillaria mellea* (Vahl) P. Kumm) for *Mushrooms* category; flowers of silver linden (*Tilia tomentosa* Moench) and acorns of pedunculate oak (*Q. robur* L.) for *Tree products* category; fruits of dog-rose (*Rosa canina* L.) and blackthorn (*Prunus spinosa* L.) for *Understory plants category*; honey of black locust (*Robinia pseudoacacia* L.) and brown hare (*Lepus europaeus* Pallas) for *Animal origin* category. The AHP alternative ranking is present in Table 1.

Table 1. AHP alternative ranking

Criterion	Mushrooms		Tree products		Understory plants		Animal origin	
	Peppery milk-cap	Honey fungus	Flowers of silver linden	Acorns of pedunculate oak	Fruits of dog-rose	Fruits of blackthorn	Honey of black locust	Brown hare
1	3	3	1	7	5	6	2	8
2	1	4	3	2	5	8	4	2
3	3	4	6	8	5	7	1	2
4	2	4	1	5	7	7	8	3
5	8	8	5	6	3	1	2	4
6	6	5	4	3	1	1	8	7
7	7	7	2	5	4	4	8	1
8	3	3	8	1	6	7	5	2
9	1	2	7	4	6	5	8	3
10	1	3	7	2	6	5	8	3
11	2	3	4	8	1	5	6	7
12	3	4	1	8	7	2	6	5
13	7	7	2	1	8	5	4	3
14	7	7	1	2	5	5	4	8
15	1	3	7	2	6	5	8	3
16	1	5	7	2	6	4	8	3
17	4	4	5	3	8	8	1	8
18	5	5	8	3	8	8	2	6
19	1	1	1	1	7	1	8	1

Results in scenario 1

The most promising NWFPs for Ialomița County were represented by black locust honey (ro. Miere), that recorded a value of 16.7%, followed by dog-rose fruits (ro. Măceș), with 15.1% and blackthorn fruits (ro. Porumbar), with 13.5% (Figure 2).

Results in scenario 2

In this scenario, when the criterion portfolio of derived products had a share of about 5 times larger than the other 18 criteria, the hierarchy of the most important non-wood products changed in the sense that the first position was held by blackthorn fruits (17%) followed by black locust honey (15.8%) and dog-rose fruits (15.5%). Like in the case of scenario 1, the less promising/important NWFPs were the peppery milk-cap and the pedunculate oak acorns.

Results in scenario 3

In the case when the criteria portfolio of derived products and the price of the derived products received a share of about 22% and the remaining 17 criteria of only 3.3%, or in other words, when we are interested to select the non-wood forest product with the highest number of derived products and with the highest prices of the derived products, the best option turned out to be dog-rose fruits. The ranking was completed by black locust honey and fruits of blackthorn. Peppery milk-cap was the last position in the top.

Results in scenario 4

In this scenario, the two most important non-wood forests products were the fruits of blackthorn and the fruits of dog-rose. Unlike the previous three scenarios, the top three was completed by pedunculate oak acorns. Like in the case of previous scenario, the last three positions were held by peppery milk-cap, honey fungus and brown hare, respectively.

Results in scenario 5

The most promising NWFP, in this scenario, was black locust honey (16.6%), followed by the fruits of dog-rose (16.1%) and the fruits of blackthorn (16%).

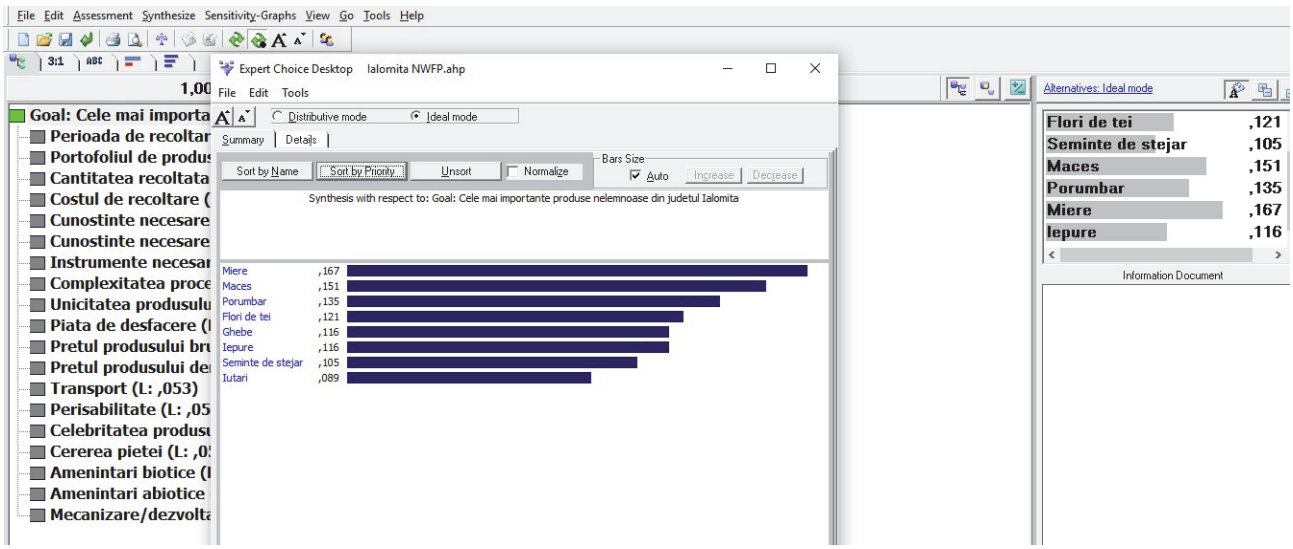

Figure 2. The ranking of the eight non-wood forest products in scenario 1

The completed results in the case of five scenarios are given in Table 2. The most promising three NWFPs were the black locust honey, the dog-rose fruits and the blackthorn fruits. The presence of black locust in the top is justified by the fact that this autochthonous tree species was introduced in Romania, especially in the southern part of the country, in the last two centuries thanks to its multiple uses, including honey production (Enescu and Dănescu, 2013). The risk regarding the harvesting and commercialization of this product is represented by the climatic factors, mainly the amount of rainfall. This is reflected in the collected quantities of honey in the period 2009-2015, in Romania, that varied between 731 tons, in 2015, and 13,850 tons, in 2011 (MEWF, 2016b).

In the case of the forest fruits existing in Ialomița County, according to the data from the

forest management plans and by taking into consideration the results of this research, dog-rose fruits were the most promising. This is in accordance with the data communicated by National Forest Administration Romsilva, according to which dog-rose fruits were the most harvested and commercialized in the period 2012-2014 (NFA-Romsilva, 2012-2014).

Table 2. Ranking of selected NWFPs in the case of the five scenarios

NWFPs	Scenario				
	1	2	3	4	5
black locust honey	1	2	2	4	1
dog-rose fruits	2	3	1	2	3
blackthorn fruits	3	1	3	1	2
silver linden flowers	4	5	7	5	5
honey fungus	5	4	5	6	6
brown hare	6	6	6	7	7
pedunculate oak acorns	7	7	4	3	4
peppery milk-cap	8	8	8	8	8

Peppery milk-cap ranked last no matter what scenario was taken into consideration, mainly due to its poorly distribution in the region.
The low performance of the acorns of pedunculate oak in the first two scenarios could be explained by the high fructification periodicity (Șofletea and Curtu, 2007) and by the very fragmented distribution range of this species, as a result of deforestation done in order to increase the farming area, which is a typical feature for the plain regions in Romania (Enescu et al., 2010), including Ialomița County.

CONCLUSIONS

Conclusions based on the data collected from management forest plans and other papers

Non-wood forest product quantities sold in Ialomita County have decreased in recent years, and their diversity is very low.
The sale of NWFPs is mainly done in the form of raw material and the large quantity of them is going to the export, due to the higher offered prices.
The annual productions are mainly influenced by weather conditions and the sales of the neighboring countries which are selling much higher quantities at cheaper prices.
National or regional forest plans pay little or no importance of analyzing the situation of these products and their superior revaluation.
Managers working in this field should take into account the consumer's demand and should harvest large quantities of NWFPs.

Conclusions regarding the AHP results

Black locust honey was the most promising non-wood forest product for Ialomița County when all the 19 selected criteria received an equal importance. In other words, in the context of the selected 19 criteria, black locust honey represents the main non-wood forest product on which forest managers should focus their attention more in the future.
In four out of the five scenarios, among the top three products were the black locust honey and fruits of dog-rose and blackthorn, changing their positions in accordance with the assigned weights for certain criteria.
The mushrooms were the lowest ranked species, which is easily explained mainly due to their more limited distribution range compared to other non-wood forest products selected in this study.
The Analytic Hierarchy Process, integrated within Expert Choice Desktop software package proved to be extremely useful for the designation of the most important non-wood forest products for Ialomița County.
By taking into consideration the current situation regarding the management of NWFPs at national level, we consider that this research represents a useful tool that could be replicated in other counties from Romania. In this manner, the chance to highlight the particularities regarding the management of NWFPs in specific regions will increase.

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