

THE MOST IMPORTANT FOREST FRUITS FROM VASLUI COUNTY

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ABSTRACT

*In Romania, the most well-known non-wood forest products (NWFPs) are represented by forest fruits, edible mushrooms and medicinal plants. The aim of this paper is to present a synthesis of forest fruits present in Vaslui County. Therefore, the most important forest fruits that were found in this area are: the raspberry (*Rubus idaeus*), the dog-rose (*Rosa canina*), the hawthorn (*Crataegus sp.*), the wild apple (*Malus sylvestris*), the Cornelian cherry (*Cornus mas*), cranberries (*Ribes nigrum L.*), the bird cherry (*Prunus padus*) and acorns (*Quercus sp.*). The most important forest fruits from Vaslui County were determined by means of an analytical hierarchy process (AHP) developed by Thomas Saaty. The analytical hierarchy process has emphasized raspberries and dog-roses as the most requested and, at the same time, the most important forest fruits from Vaslui County. Using the analytic hierarchy process in estimating the importance of fruit species from a certain County proved to be an efficient method of classifying them.*

KEY WORDS: raspberry, rose, forest fruits, Vaslui County.

INTRODUCTION

‘Non-wood forest products’ (NWFPs) is a concept that refers to ‘goods of biological origin other than wood-derived from forests, other wooded land and trees outside forests’ according to FAO (The Food and Agriculture Organization) (FAO, 1999). Amongst the most well-known NWFPs there are forest fruits, edible mushrooms, medicinal and aromatic plants. Non-wood forest products comprise products that are used as food or nutriment (nuts, mushrooms, fruits, medicinal and aromatic plants), resin, latex or diverse animal or vegetal products used for medicinal and cosmetic purposes (Dincă, & Timiș-Gânsac, 2020).

Within the FP1203 COST Action ‘European non-wood forest products (NWFPs) Network’ a common survey was initiated to provide a snapshot of the state of the art of NWFP collection and usage within Europe. Members of the FP1203 COST Action were asked to provide data for 20 important NWFP within their

respective country (Vacik et al, 2019). The software used in this article is one of the products developed during the aforementioned COST Action.

In Romania, the National Forest Administration (i.e. Romsilva) is the largest traditional supplier of forest fruits, selling annually more than 3000 tones. According to Romsilva, the most valued and sought after berries from the spontaneous flora of Romania are blueberries, raspberries and blackberries which grow in the Carpathian Mountains. After being purchased, the products are transported to processing centres, where they are sorted and preserved in order to keep their qualities unaltered. (www.rosilva.ro).

The aim of this paper is to present the main forest fruits that are found in forests from Vaslui County. Vaslui County is situated in the eastern part of Romania and represents 2,2% of the entire surface of the country, covering 5318 square kilometres (www.insse.ro) (fig. 1). The terrain consists of high hills and wide valleys. The average altitude is around 300 metres varying between the maximum value of 485 metres and the minimum altitude which is 10 metres, in the Prut meadow. The climate is temperate-continental, being characterized by hot and dry summers and frosty winters. Oak and beech forests are found throughout the county (Wikipedia, judeţul Vaslui). There are 80 148 hectares of forest and the national forest administration, Romsilva, is organized in 6 district units managing 49 945 hectares. The forests include hard-wood species (47%), soft-wood species (19%), oak (24%), beech (9%) and coniferous (1%) (www.vaslui.rosilva.ro).

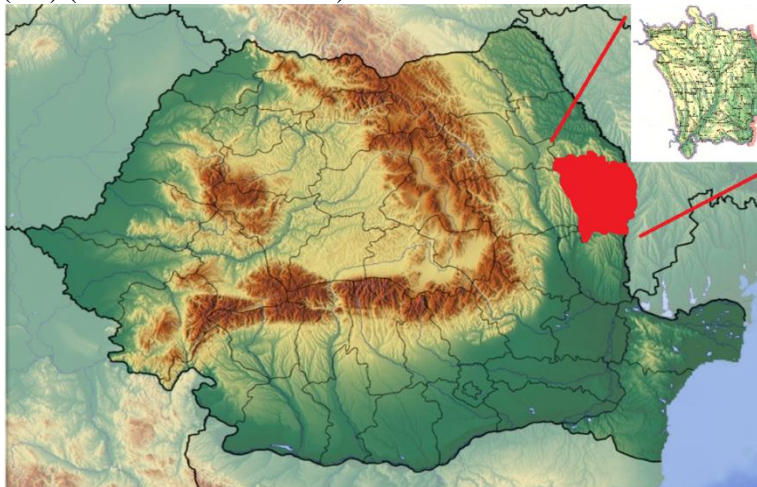


FIG. 1. Location of Vaslui County

MATERIAL AND METHODS

In this paper we applied an analytical hierarchy process (AHP) developed by Thomas Saaty. This process can be used for complex decision-making using well-established criteria (Saaty, 2008). In the case of the present work, 19 criteria were used, and for their measurement, a scale of 1 to 8 was applied as follows: harvesting period (1=the shortest harvesting period ... 8=the longest harvesting period), harvested quantity / worker / 8 hours (1=the lowest quantity ... 8=the highest quantity), harvesting cost (1=the lowest cost ... 8=the highest cost), harvesting knowledge (1=the most recognizable product ... 8=the hardest recognizable product), tools needed for harvesting (1=the least ... 8=the most), complexity of the harvesting process (1=the lowest ... 8=the highest), development of harvesting process (1= undeveloped ... 8=extremely developed), knowledge for recognition (1= the least necessary knowledge ... 8= the most necessary knowledge), distribution range (1=the lowest ... 8=the highest), biotic threats (1=the fewest threats ... 8=the most threats), abiotic threats (1=the fewest threats ... 8=the most threats), perishability (1=the lowest ... 8=the highest), market potential (1=low ... 8=high), market demand (1=the lowest ... 8=the highest), 'popularity' of the product on market (1=the least known ...8=the most popular), the price of raw product (1=the lowest ... 8=the highest), the price of the derived product (1=the lowest ... 8=the highest), portfolio of derived products and transport (1=the smallest number of derived products ... 8=the highest number of derived products).

A number of three experts has independently analyzed all 19 criteria and given grades from 1 to 8 without repeating. The next step was to obtain an average of these grades in a way that values are also from 1 to 8 and are not allowed to repeat. These average values are introduced in a specific software and the result was a ranking diagram.

The Analytic Hierarchy Process (AHP) was used and the alternatives (i.e. the NWFPs) were pairwise compared against each other in order to determine the NWFPs with the highest potential for Vaslui County as it can be seen in figure 2.

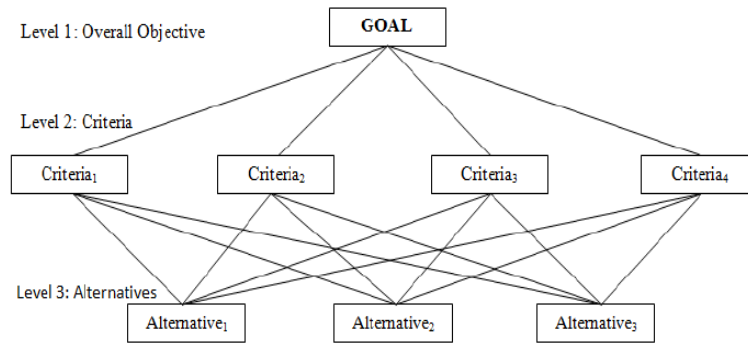


FIG. 2. Analytic Hierarchy Process (AHP) using 19 criteria and 8 alternatives

The Analytical Hierarchy Process (AHP) is a multi-criteria decision-making method, which allows the pairwise comparison of management alternatives with respect to single-decision criteria based on a ratio scale (Vacik et al, 2019).

These criteria were used in other papers that have studied non-wood forest products from Romania. Similar works were made for the counties Dâmbovița (Braga, and Dincă, 2019; Cântar, and Dincă, 2020), Vrancea (Tudor, and Dincă, 2019), Bistrița-Năsăud (Tudor et al., 2020), Satu Mare (Tudor et al. 2019), Arad (Pleșca et al., 2019; Enescu, and Dincă, 2020), Bacău (Blaga et al., 2019), Sibiu (Vechiu, and Dincă, 2019), Gorj (Vechiu et al. 2019).

RESULTS AND DISCUSSION

The forest fruits selected for the alternative AHP hierarchy were: raspberries (*Rubus idaeus*), dog-roses (*Rosa canina*), hawthorns (*Crataegus sp.*), wild apples (*Malus sylvestris*), Cornelian cherries (*Cornus mas*), cranberries (*Ribes nigrum L.*), bird cherries (*Prunus padus*) and acorns (*Quercus sp.*). This AHP process is based on the experts' opinion regarding all 19 criteria (table 1).

In regard to harvesting costs and tools, apples and dog-roses are the most expensive forest fruits while raspberries and acorns are the cheapest ones. When the 'perishability' and the 'market potential' criteria was analysed it was found that the lowest values were registered by acorns while the highest perishability and a higher market potential was registered for raspberries. These extreme hierarchy values were the same when experts analysed other criteria such as the price of the raw product, the

price of the derived products, the portfolio of derived products and the transportation from the harvesting place to the storage centre.

The most important forest fruits from Vaslui County that have resulted from the AHP analysis are the raspberries, the dog-roses and the hawthorns. They are followed by wild apples, the Cornelian cherries, the cranberries and the bird cherries while the least important ones are acorns.

The most important forest fruits from Dambovița county are also raspberries (Braga, and Dincă, 2019), while in Sibiu county there are the blackberries (Vechiu, and Dincă, 2019), in Gorj county there is the sea-buckthorn (Vechiu et al. 2019), in Bacău county there are the truffles and the penny buns (Blaga et al., 2019).

Rubus is one of the most diverse genus, comprising over 400 species subdivided into 12 members of the genus. The domesticated members of the genus contain the raspberries, the blackberries, the arctic fruits, and the flowering raspberries. The most important raspberries are the European red, *R. idaeus* L. subsp. *idaeus*, and the place of origin of the raspberry has been postulated to be the Ida Mountains of Turkey (Jennings, 1988). Red raspberry (*Rubus idaeus* L.) is cultivated throughout the world and there has been a growing market and a considerable increase in the production of raspberry during the last two decades (FAO, 1999).

Roses belong to *Rosa* genus in the *Rosaceae* family. *Rosa* genus contains over 100 species that are widely distributed throughout Europe, Asia, the Middle East, and North America (Nilsson, 1997). The *Rosa canina* L. fruits have constituted an important source of food and medicine. The most common food preparations using roses include juice, wine, tea, jelly, jam etc. The fruits of the rose species are considerably beneficial for human health since they contain minerals, vitamins, sugars, phenolic tannins, organic acids, fruit acids, aminoacids, volatile oils (Kazaz et al., 2009).

The *Crataegus* genus (Hawthorn) originates in the northern temperate regions and is composed of more than 250 species being widespread throughout western Asia, North America and Europe. Besides its wide horticultural use as an ornamental bush species, it is considered as one of the oldest pharmaceutical plants of the western world and is described in various pharmacopoeias (Bahourun et al., 2003).

TABLE 1. The classification of the 19 criteria used in the AHP analysis are rendered for Vaslui county

Criterion	Berries							
	<i>Rosa canina</i>	<i>Rubus idaeus</i>	<i>Ribes nigrum</i>	<i>Crataegus</i>	<i>Cornus mas</i>	<i>Malus sylvestris</i>	<i>Prunus padus</i>	<i>Quercus sp.</i>
	1	2	3	4	5	6	7	8
1 Harvesting period	8	1	2	7	3	4	5	6
2 Harvested quantity / worker / 8 hours	6	1	2	5	3	7	4	8
3 Harvesting cost	7	4	2	6	5	8	3	1
4 Knowledge for harvesting	5	1	3	6	7	2	8	4
5 Tools needed for harvesting	7	1	2	6	3	8	4	5
6 Complexity of harvesting process	8	3	2	7	4	6	5	1
7 Development of harvesting process	8	1	2	7	3	6	4	5
8 Knowledge for recognition	3	1	4	6	7	2	8	5
9 Distribution range	8	6	2	5	3	4	1	7
10 Biotic threats	1	8	7	2	4	6	3	5
11 Abiotic threats	1	8	7	6	5	4	3	2
12 Perishability	2	8	7	3	5	4	6	1
13 Market potential	7	8	6	5	4	3	2	1
14 Market demand	7	8	5	6	2	4	3	1
15 "Celebrity" of the product on market	7	8	3	6	2	5	1	4
16 The price of raw product	6	8	5	7	4	2	3	1
17 The price of the derived products	7	8	5	4	6	3	2	1
18 Portfolio of derived products	6	8	3	4	7	5	2	1
19 Transport (harvesting - storage center)	2	8	7	4	5	3	6	1

CONCLUSIONS

Vaslui County has a high diversity of forest fruits and the most important are presented in this article. The analytical hierarchy process has emphasized the raspberry and the rose as the most sought after forest fruits and, at the same time, raspberries are the most important fruits from Vaslui County, according to the AHP hierarchy. Using the analytic hierarchy process in estimating the importance of fruit species from a certain County, has proved to be an efficient method of classifying them based on the largest quantity of criteria that can be considered. Non-wood forest products should be an important alternative for the forest economy.

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