

**THE MAIN FOREST FRUITS FROM CĂLĂRAȘI COUNTY ACCORDING
TO THE ANALYTICAL HIERARCHY PROCESS**

Ienășoiu Gruiță^{1*}, Zaharia Alexandru¹, Cucu Alexandru¹, Serban Tibor¹,
Dincă Lucian¹, Răducu Răzvan¹

¹"Marin Drăcea" National Institute for Research and Development in Forestry

* Correspondence author. E-mail: igruița@gmail.com

Keywords: Analytical Hierarchy Process(AHP), forest fruits, market request

ABSTRACT

Favoured by its geographic position and pedoclimatic conditions, Romania has one of the most varied and characteristic flora from the European continent. As such, this flora contains over 3600 superior plant species (phanerogams), that are spontaneous or from culture, 10-12% are used in the scientific and traditional Romanian medicine (Constantinescu, 1986). Among them, a series of superior forest plants have distinguished themselves as their fruits are situated in a product category with a high nutritional density. These fruits contribute in balancing the diet of contemporary humans (Mincu et al., 1989).

The present study proposes the emphasizing of some production capacities from Călărași County. The county climate offers relatively limited conditions, characteristic for the steppe and silvosteppe areas but that are important for the production of some forest fruits.

INTRODUCTION

In Romania, forest fruits are situated within the resources that have a sanogen character, besides medicinal plants, spontaneous edible mushrooms, nectar and pollen.

At a national level, there have been identified 283 plant species with therapeutical effects from among approximately 140 that have an economic purpose (Mocanu, 1998,1999). Among them, forest fruits have stood out in the past decades by a production of approximately 30000 tons. They have an abundance of active principles, as they contain high quantities of vitamin C and P, provitamin A, B group vitamins as well as other mineral elements (Beldeanu, 2004).

Under other classifications, forest fruits belong to forest accessory products while the old specialty silviculture literature groups them in the 1st category together with resin and bark. Later on, forest fruits have been defined under the name of non-wood forest products (NWFPs). This fact reflects their structure, namely that forests contain some plants that produce fruits, including wood plants (shrubs or trees). The present category contains normal fruits formed from the ovary, containing seeds inside, while their pericarp is pulpy and forms the fruit's edible part. The fruit's middle layer, also known as mesocarp, forms the largest part of the fruit's pulp and contains numerous cells with thin walls that contain inside them vacuoles full of cellular juice (Ciuta, 1961).

The most important forest fruits used in nutrition are: blueberries, wild strawberries, brier, cranberries, blackberries and raspberry. They are known for their physical and chemical properties that are extremely important in the food and cosmetic industries (Dincă, 2018).

The purpose of this paper is to emphasise the distribution of forest fruit production from Călărași County and to identify the climatic and geomorphologic conditions that influence this distribution.

From a geographic perspective, Călărași County is located in the south of Bărăganului Plain. With a surface of approximately 5088 km² (<https://www.wikipedia.org/>), the county is located in Argeș hydrographic basin, an affluent of the Danube.

The surface of the forest fund from Călărași County is of approximately 22275 hectares, being the county with the smallest afforested surface (INS,2020). The National Forest Institute within Călărași Forest District manages 20082 hectares from this surface. The remaining hectares are privately managed.

MATERIAL AND METHODS

The scientific documentation used for the present study consists of a series of bibliographic and cartographic analyses (ex. Fig. 1.) regarding the factors that influence qualitatively and quantitatively the production of forest fruits from Călărași County.



Figure 1. The location of forest bodies from Călărași County

The 21084 identified forest hectares contain approximately 6500 hectares of Euromerican poplar clone cultures, 4500 hectares of locust and approximately 10500 hectares of quercus stands accompanied by other species such as linden (*Tilia platyphyllos*), white poplar (*Populus alba*), locust (*Salix* spp.), etc..

These vegetal associations also include a series of trees and shrubs that generate forest fruit productions such as: brier (*Rosa canina* L.), white sea buckthorn (*Hippophae rhamnoides* L.), raspberry (*Rubus idaeus* L.), blueberry (*Ribes nigrum* L.), forest pear (*Pyrus pyraster* L.), hag berry (*Prunus padus* L.), Turkish hazel (*Corylus colurna* L.), and Turkish cherry (*Prunus mahaleb* L.) (Vasile et al., 2016).

The analysis and synthesis of the obtained data was based on an analytical hierarchy process (AHP). This method has been scientifically based on a multicriteria analysis model of decisions taken in different activities domain (Saaty, 2008).

AHP is concerned with the scaling problem the sort of numbers that are used and how to correctly compensate the priorities obtained from them (Saaty, 1990). The scale of measurements consists of three elements: a group of objects, a group of numbers and a mapping of the objects to the numbers. The measurements included in AHP can be relative or absolute while the standard scale is not unique. This leads to the importance of interpreting the meaning of every number used in the specific scale (Saaty, 1990).

As such, the process was used in determining the most representative forest fruits from Călărași County. The following criteria was established for all forest fruits met in experimental zones, taking the place of objectives like: harvesting period, harvested quantity by one worker in 8 hours, harvesting cost, harvesting knowledge, tools needed for harvesting, complexity of harvesting process, the threats, perishability, market potential, market demand, “celebrity” of the product on the market, the price of raw product, the price of the derived product, portfolio of derived products and transport from the harvesting point to the storage centre. These criteria have also been used in other similar studies from different counties such as: Maramureș (Enescu et al., 2017), Gorj (Vechiu et al., 2018), Prahova (Enescu et al., 2018), Timiș (Enescu et al., 2018) and Bihor (Timiș-Gânsac et al., 2018).

RESULTS AND DISCUSSIONS

An alternative AHP ranking was obtained by implementing all datasets. Different types of leakages have been made between berries and criteria. A key number from [1...8] has been attached for all criteria. Afterwards, the program mapped them with different types of arithmetic formulas like matrices. The 19 criteria have been approved and verified by specialists: Harvesting period, Harvested quantity / worker / 8 hours, Harvesting cost, Knowledge for harvesting, Tools needed for harvesting, Complexity of harvesting process, Development of harvesting process, Knowledge for recognition, Distribution range, Biotic threats, Abiotic threats, Perishability, Market potential, Market demand, “Celebrity” of the product on market, The price of raw product, The price of the derived products, Portfolio of derived products, Transport (harvesting - storage centre).

We can see that the fleshy pulp is rather perishable for fruits that have drupes as a fruit (raspberry, sea buckthorn and even rarely brier). However, they have a high demand on the market so they present a high market potential (Figure 2. and Figure 3.). Sea buckthorn, raspberry and Turkish cherries are strongly influenced by biotic factors (Figure 4), that influence over time their internal structure. In the case of brier, sea buckthorn and raspberry, abiotic factors showcase a high degree for destroying their internal structure (Figure 5), especially under climatic changes, temperature inversions and humidity.

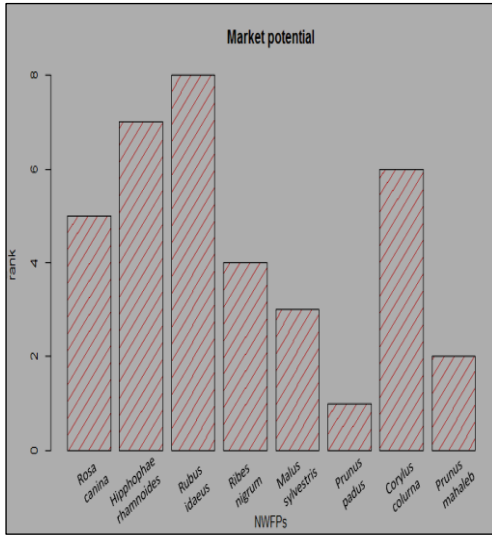


Figure 2. Forest fruits ranked for Market potential

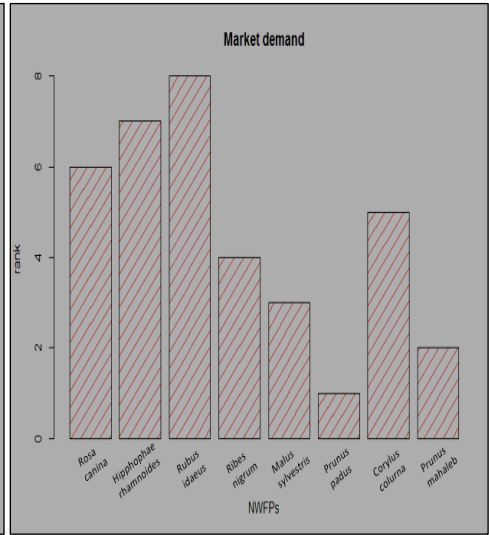


Figure 3. Forest fruits ranked for Market

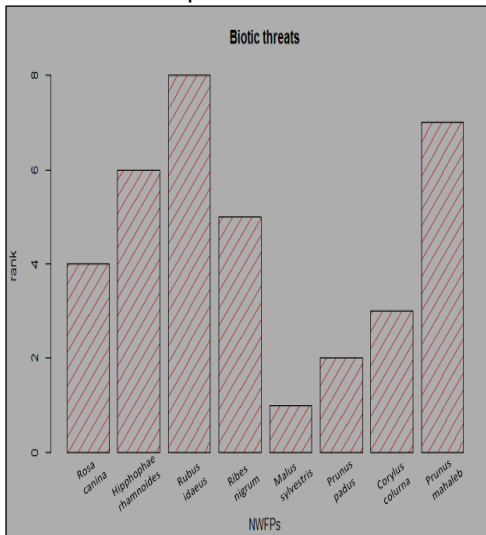


Figure 4. Forest fruits ranked for Market

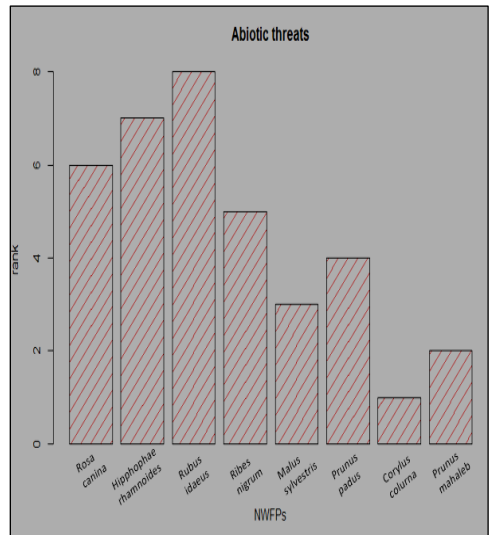


Figure 5. Forest fruits ranked for Abiotic threats

The Expert Choice Desktop (v. 11.5.1683) was used as an analysis software for establishing the leakage between objects and numbers.

Based on this software program, the most popular and requested forest fruits are sea buckthorns, Turkish cherries and Turkish nuts (Figure 6).

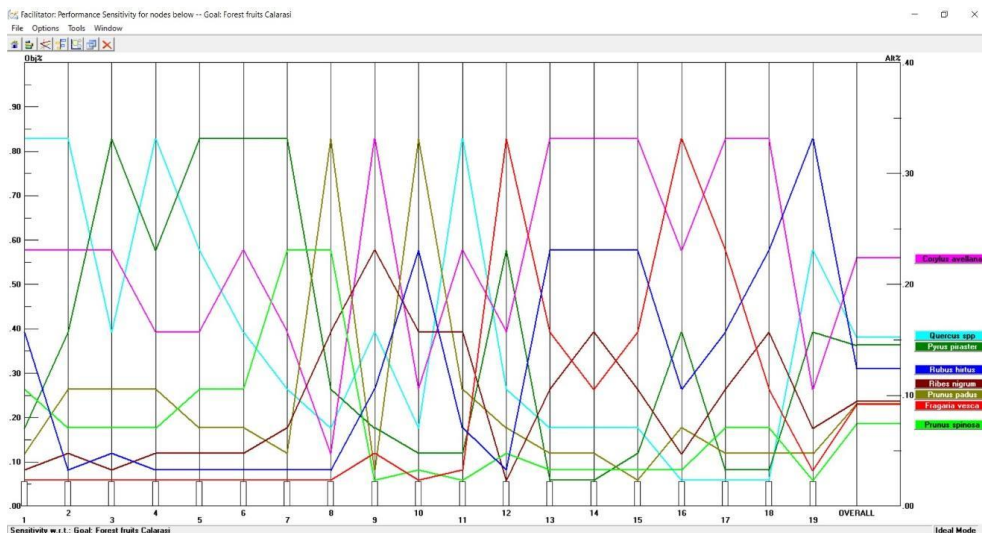


Figure 6. Ranking of the eight forest fruits defined by 19 criteria

CONCLUSIONS

The analytical hierarchy process (AHP) and the analysis realized with Expert Choice Desktop have identified three main species that produce forest fruits in Călărași County. In addition, they answer to optimum requests (from harvesting and storage costs up to the market requests) based on 19 variables. These include specific variables and especially restrictive and even limitative ones imposed by biotope and ecotope (harvesting period, perishability, market potential etc.).

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