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HONEY RESOURCES OF AVRIG CITY (SIBIU COUNTY) AND ECONOMIC RELEVANCE

Iuliana ANTONIE

"Lucian Blaga" University, The Faculty of Agricultural Sciences, Food Industry and the Protection of the Environment, Sibiu, 7-9 Dr. Ion Raţiu, 550012, Sibiu, Romania, Phone: +40 269 211338, Fax: + 40 269 213381, E-mail: iuliana_antonie@yahoo.com

Corresponding author: iuliana_antonie@yahoo.com

Abstract

The work is part of a broader theme of flora honey more research of Sibiu. The current study aims at identifying the plants bees Avrig city and its surroundings. They highlighted important issues such as heat index of flowering (T^0C), average time trigger flowering for each identified species, honey production (kg/ha) and the share of agriculture. The research methods applied in the study there were: documentation based on a specialized bibliography, direct observation in field, collection of plant material, the use of the photo database which characterizes the investigated area. There were identified 45 species of bees collecting nectar in the spontaneous and cultivated area. The flowering period of this species was from March to August. In Avrig area, beekeeping area is a good occupation for local people due to climate and biodiversity of plants suitable for nectar pickings.

Key words**:** *honey production, Avrig (Sibiu)*

INTRODUCTION

Symbiosis bee-flower bears in the world the message of eternity. The DNA which encoded genes is responsible for the change of behavior, and for the assurance of an existential condition and especially for the beauty of our lives. The triad bee-flower-man is responsible for the terrestrial existence.

Freedom was regarded in antiquity as the god of bees. For not be lost, bees were shut down in a hollow, which was the first hive. Honey was a miracle left for future generations [9].

Bee was seen, always, "as a masterpiece of creation" [8]. An inspired subject by many facets of behavior, a whole encyclopedia about productions, social organization, attitudes and moral codes, topics of scientific research. The scientiifc research solved the controversial subjects such as the honeycomb geometry and the enigm of communication among bees, which brought the Nobel Prize to the biologist Karl von Frisch. The local inhabitands of oru land in the past, and even the Ottomans and the Venetians knew the uses of honey and wax. [6]

Pliny the Elder exclaimed: "What men can be, in good faith, like bees for intelligence" [12]. He recorded the cosmic factor in the production of honey from honeydew, "a liquid that is either sweat of the stars or the stars' saliva or secretion of air purification" [14].

The flower, a symbol of beauty and love, allows a youmg girl to count the petals and think of her lover to meet him. Some forgotten lyrics say: "It would be flowers on the bush/would wax torches/flowers like all of us coming/sweet honey bee" (unidentified). Flowers are attached to the end of our existence by giving it an aura of tranquility. "The acacia tree rains its flowers. Grandpa sits on the porch. He is thinking. What is he thinking? At nothing. Just the flowers are falling". [20]

As regards man, the last creation, called to offer brightness triad, it fulfills its role, correlating in an ingenious mannare the contribution of all.

Bees have stimulated interest in research on food and essential role of the flora their bees from an apiary area [1,2,6,7]. Romania today has 11 million hectares of natural or cultivated flora to produce about 20,000 tons honey [21]. Beekeeping in our country has become a lucrative business because soil and climate enable the development of bee flora in all the

regions. Sibiu County is no exception. Beekeeping has become an increasing concern especially in villages.

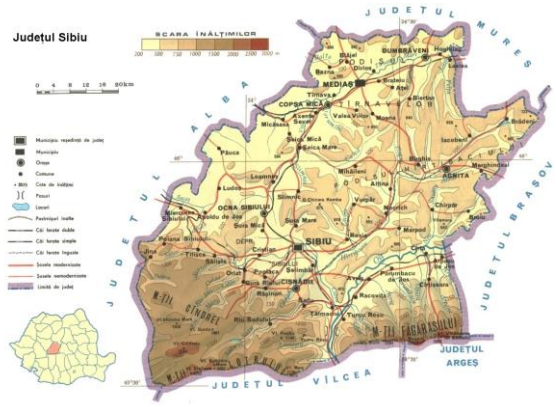

Fig. 1. The localization of Avrig locality in Sibiu County
Source: http://pe-harta.ro/Sibiu/

The statistics carried out by the Directorate for Food Safety and Veterinary Sibiu mentioned an increased number of bee colonies from 15,451 families registered in 2010 to 20,679 families registered in 2013, therefore by 26 % more bee colonies[22]. Under these circumstances, the interest in honey flora of Sibiu has also increased [15-19].
The work is part of a larger study that aims to analyze the diversity of the bee flora in the Sibiu area.

MATERIALS AND METHODS

The study was carried around the Avrig city in the period 2015-2016.
To achieve the proposed objectives of the paper there were considered the following specific methods:
- Using information from the literature;
- Using information taken from the field or by observation in order to inventory the main species of bee plants or by the direct qualitative collections of plants;
- Taking photos to complement the database of bee flora of the study area;
- The lab was used to analyze the studied material and draw up the list of flora [3, 5, 10-14].

RESULTS AND DISCUSSIONS

The natural environment that provides a trophic support for the development in symbiosis of the bees and flowers in the physical and geographical area of Avrig. Seated, at 26 km distance from Sibiu, in a true natural amphitheater, the complex topography benefit of a large range of forms from the Olt River valley to the peaks of the Fagaras Mountains (Fig. 1).
The diversity of the landscape caused a great diversity of flora (Fig.2, Fig.3).

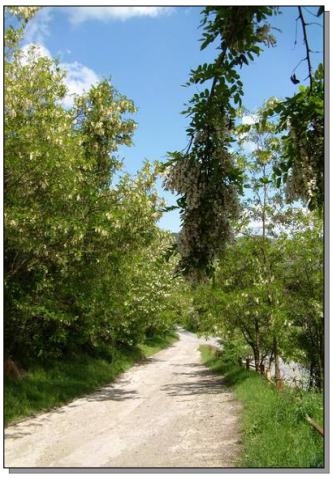

Fig. 2.*Robinia pseudoacacia* L. - acacia (original)

Fig. 3. *Fragaria vesca* L. Fraga-bee-pollinated (original)

Avrig area includes over 402 species of cormophytes [4]. Of these, in the period of the study, there were 45 plant species identified as suitable for honey production (Table 1).

Table 1. The meliferous basis in Avrig locality (Sibiu County) in 2015-2016.

Nr	Species name	The termic index of blooming (T^0 C)	The average data of blooming	Honey production (kg/ha)	The apiarian weight
1.	2.	3.	4.	5.	6.
Asteraceae					
1	*Helianthus annuus* L.	1,000-1,100	24.06-30.07	34-122	Very big
2	*Taraxacum officinale* L.	176-275	05-15.04	200	Medium
3	*Centaurea cyanus* L.	1,320-1,463	02-22.07	50-60	Small
4	*Crataegus monogyna* Jacq.	550-645	01-14.05	35-100	Medium
5	*Arctium lappa* L.	1,275-1,450	15-27.07	30-50	Small
Apiaceae					
6	*Eryngium campestre* L.	1,750-1,980	10-30.07	100-300	Medium
Brassicaceae					
7	*Brassica napus oleifera* L.	220-330	10-20.04	40-100	Big
8	*Brassica rapa oleiferă* L.	220-330	10-20.04	30-100	Big
9	*Sinapis arvensis* L.	765-940	20-30.05	40	Medium
Cucurbitaceae					
10	*Cucumis sativus* L.		20.06-16.08	20-100	Small
Ericaceae					
11	*Vaccinium myrtillus* L.	525-680	05-15.05	15-30	Medium
Fabaceae					
12	*Robinia pseudoacacia* L.	600-765	10-20.05	800-1200	Very big
13	*Onobrychis viciifolia* Scop.	1,038-1,235	05.05-06.06	120-300	Big
14	*Trifolium repens* L.	765-940	20-30.05	100-250	Big
15	*Medicago sativa* L.	680-850	15-25.05	25-200	Medium
16	*Vicia pannonica* Cr.	765-940	20-30.05	30-50	Medium
17	*Vicia sativa* L	850-960	25-31.05	10-30	Medium
18	*Vicia villoasa* L.	765-940	20-30.05	30-100	Medium
19	*Trifolium pretense* L.	1,230-1,430	15-25.06	25-50	Medium
20	*Medicago lupulina* L.	1,230-1,450	07-27.06	30-40	Medium
21	*Medicago falcate* L.	680-850	15-25.06	30	Small
Grossulariaceae					
22	*Ribes nigrum* L.	275-395	14-24.04	20-50	Medium
Lamiaceae					
23	*Mentha aquatica* L.	1,400-1,575	22-30.06	220	Big
24	*Thymus serpyllum* L.	1,230-1,430	15-25.06	150-220	Medium
25	*Salvia verticillata* L.	1,330-1,540	20-30.06	400-600	Medium
26	*Mentha piperita* L.	1,620-1,870	05-15.07	100-200	Medium
27	*Mentha spicata* L	1,620-1,870	05-15.07	100-200	Medium
28	*Stachys recta* L.	1,130-1,335	10-20.06	150-250	Medium
29	*Melissa officinalis* L.	475-502	28.05-20.06	100-150	Medium
30	*Salvia pratensis* L.	798-960	22-31.05	280	Medium
31	*ia officinalis* L.	1,750-1,980	10-20.07	200-400	Medium
32	*Origanum vulgare* L.	1,130-1,335	10-20.06	70-80	Medium
33	*Lamium album* L.	680-850	15-25.05	100-180	Medium
34	*Lamium purpureum* L.	80-135	20-31.03	50-90	Medium
Rosaceae					
35	*Rubus idaeus* L.	1,038-1,235	05-15.06	50-200	Very big
36	*Prunus armeniaca* L.	200-300	11-23.03	25-40	Medium
37	*Cerasus avium* (L.) Moench	220-330	10-20.04	30-40	Medium
38	*Malus domestica* Borkh	350-450	20-30.04	30-42	Medium
39	*Rubus caesius* L.	798-960	22-31.05	30-50	Medium
40	*Prunus spinosa* L.	350-450	20-30.04	25-40	Medium
41	*Prunus domestica* L	300-350	15-25.04	20-30	Medium
42	*Fragaria vesca* L.	?	20.04-29.05	30-40	Small
Salicaceae					
43	*Salix alba* L	100-135	20-30.03	100-150	Big
Tiliaceae					
44	*Tilia tomentosa* Moench	1400-1450	17-27.06	1200	Very big
Liliaceae					
45	*Allium cepa* L.	1330-1540	20-30.06	70-150	Medium

In Avrig area, the honey suitable for honey include herbaceous species, shrubs and trees. The vast majority of plants are part of spontaneous flora, and some of them are cultivated. The 45 plant species belonging to 12 plant families have been: *Asteraceae, Apiaceae, Brassicaceae, Cucurbitaceae, Ericaceae, Fabaceae, Grossulariaceae, Lamiaceae, Rosaceae, Salicaceae, Tiliaceae* and *Liliaceae*. The most represented family is Lamiaceae with 12 species (27.3%) followed by *Fabaceae* family including 10 species (22.22%), *Rosaceae* with 8 species (17.17%),

Asteraceae with 5 species (11.11%), *Brassicaceae* with 3 species (6.66%). At the opposite pole there are the families *Apiaceae, Cucurbitaceae, Ericaceae, Grossulariaceae, Salicaceae, Tiliaceae* and *Liliaceae* each with only one species (2.22%) (Fig. 4).

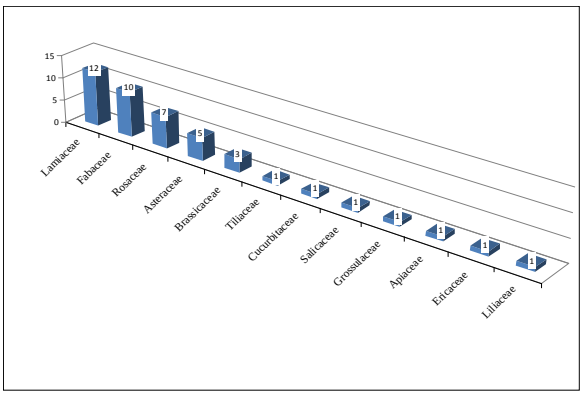

Fig. 4. Numerical abundance of plant species for bees in the surroundings of Avrig (Sibiu)

In terms of share of the honey bee base, in the Avrig area, the plants were divided into 4 categories (Table 1):

- Plants with a very large share in beekeeping with a high potential which could assure high yields of honey: *Helianthus annuus* L., *Robinia pseudoacacia* L., *Rubus idaeus* L. and *Tilia tomentosa* Moench. The four species represent 8.88% of the total of 45 floriferous species.
- Plants with a large share of the honey potential like: *Brassica napus oleifera* L., *Brassica rapa oleiferă* L., *Onobrychis viciifolia* L., *Trifolium repens* L., *Salix alba* L, *Mentha aquatica* L.

These six species represent 13.33% of the total flower base.

- Most are the plants suitable for middle-bee pickings, which could sustain the nectar and pollen production. The 29 floriferous species represent more than a half of the studied flora (64.44%).
- The plants with a small share, offering nectar and pollen necessary for bee family survival without picking production, are represented by a small number of floriferous species, only 4 (8.88%).

From an economic point of view, only the first three categories are important because they contain plants suitable for bee pollination providing a good honey production. The blooming period depends on species (Table 1). These species are active throughout the season, ensuring the picking required for the maintenance of the bee family and mainly for growing and preparing the contingent of young bees for winter.

The plant flowering period begins in March for the following species: *Lamium purpureum* L., *Prunus armeniaca* L., *Salix alba* L. and it ends in August, with the flowering species *Cucumis sativus* L.

CONCLUSIONS

In the surroundings of Avrig, there were identified 45 species of bee plants belonging to 12 botanical families.

The Family *Lamiaceae* with 12 species is the best represented. The families *Apiaceae, Cucurbitaceae, Ericaceae, Grossulariaceae, Salicaceae, Tiliaceae și Liliaceae* comprise only one species of honey.

The methods used to achieve the study were: the analysis of the bibliographic, direct observation in order to inventory the flora in the ecosystem, direct collection of botanical material to analyze it in the laboratory, realization of photographic images.

The Avrig base of plants for honey bees was divided into four categories: plants with a very high share (8.88%), plants with large share in beekeeping (13.13%), middle-bee plants (64.44%) and plants with a small share in beekeeping (8.88%).

In Avrig area, beekeeping has become a profitable occupation due to the mild climate from March to the end of August and due to the generous nature offering the city the biodiversity of plants for honey, lime and acacias forests, and areas cultivated with sunflower, and fruit trees (apple, apricot, and cherry trees).

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