

DATA CONCERNING MELLIFEROUS AND MEDICINAL VEGETATION IN HILL AND MOUNTAINOUS AREAS OF ROMANIA

ION NICOLETA

** Institute for Beekeeping Research & Development, Romania*

Summary

In the last time, there are more and more discussions about the possibility of appearance of new kind of apiaries near the conventional and ecological ones, respectively apitherapeutic apiary, which are specialized in providing the apitherapeutic chemists and doctors with the different apiculture products that are pure and not unpurified (for instance, pollen of dandelion, mint honey, buck wheat etc.). In view to develop such an apiary, the beekeepers need to know very well the melliferous flora and the proportion of the medicinal and melliferous plants. Moreover the classical kind of acacia and lime honey there are other honey sorts, and in the same time, there are some specific kinds of pollen coming from the medicinal and melliferous plants, but the beekeepers has to know very well where to go with their beehives in view to get these kinds of honey and pollen.

That is why the present paper has the aim to promote the areas with medicinal and melliferous plants from the hilly and mountain areas from Romania in view to rationally valorize this economic potential even by the development of the stationary apiaries or by the development of pastoral ones.

For determination and promotion melliferous and medicinal vegetation in hill and mountainous areas of Romania with a view to acknowledge their contribution to a superior valorisation there were studied different bibliographic materials that are characterising the hilly and mountains zones.

Taking into account the climatic conditions from our country and the good results the local beekeepers obtained, we consider that the hilly and mountain areas from our country are very favorable for the development of the apitherapeutic apiaries. The medicinal and melliferous flora from these areas can contribute to the increasing of the apiaries productivity and the promotion of the specialized apiculture in our country.

MATERIALS AND METHODS

For determination and promotion melliferous and medicinal vegetation in hill and mountainous areas of Romania with a view to acknowledge their contribution to a superior valorisation there were studied different bibliographic materials that are characterising the hilly and mountains zones, but also there were realised the stock-taking and the classification of the melliferous and medicinal species, by orders and families, been realised their geobotanical, melliferous and medicinal characterisation, on different purposes using categories as follows:

- I. Mountain meadows.
- II. Alpine meadows.
- III. The valley, riverside and basin meadows.
- IV. Harvests (false acacia, tillia, sweet chestnut).
- V. Mildew harvests.

RESULTS AND DISCUSSIONS

Because of the great variability of land configuration, our country possesses three main vegetation areas, namely:

- Plain vegetation 36%;
- Hill vegetation 33%;
- Mountainous vegetation 31%.

The economic and ecologic importance of hilly and mountainous vegetation is hard to underestimate. These enormous green surfaces, amounting at 64% of the total area of our country represent:

- A food source for livestock;
- A habitat and food source for wild animals;
- A mean to prevent and control soil erosion;
- A mean to enrich soil structure and fertility;
- A source of herbs;
- A food source for honey bees;
- A source of alternative incomes.

Due to the richness and great diversity of flora and vegetation, hilly and mountainous regions constitute a highly valuable melliferous area, which insures abundant nectar and pollen for honey bees' families during the harvesting season. A proof of this is that within these areas the largest number of honey bees' families in Romania is concentrated. Most of these areas are covered with natural meadows and forests.

Natural or permanent meadows are lands covered with naturally occurred vegetation, on places with grubbed forests and on wastelands. In Romania, permanent meadows amount are to around 30% of the total agricultural area and to about 20% of the total area. Their distribution is not homogeneous, with the largest permanent meadows found in counties with significant mountainous areas. At county level there are 13 counties where permanent meadows represent more than 40% of the agricultural area, notifying large areas in counties like Hunedoara, Harghita, Maramures and Caras-Severin.

Permanent meadows in the Romanian hilly and mountainous areas is characterised by a great variety of flora, as a result of the standing factors variety, of the use and care methods. Weather conditions specific to hilly and mountainous areas influence the composition and development of vegetation, and the valorisation of these resources for apicultural purposes. Besides soil, moisture and general climate conditions, the micro relief plays an important role in the composition, structure and distribution of vegetation. Natural meadows are, besides the main fodder source, an important honey source, which, if properly valorised in apicultural purposes could bring important additional incomes to neighbouring apiaries.

From the hilly area to the mountains and alpine storey, in valleys, eroded fields or extra moist areas many different meadows are found; meadows where *graminaceae* along with leguminous plants (valuable honey plants) are dominant plants. Many other species from different genres are found alongside these species. Their participation in meadow vegetation ranges according to standing conditions, manner of maintenance and use (pasturing or mowing). Generally, the value of a meadow is estimated by the percentage of these species. Therefore, the greater the participation percentage the more devalued the respective meadow is. This manner of appreciation/estimation is based on the fact that *most species of other botanic genres* are economically inferior; this is why they are rarely described under the generic name of *meadow weeds*. Yet, research emphasized the high nutrient content in certain *species of these botanic families*. It is also estimated that some of them are utterly needed on meadows, as, because of their high content in microelements and generally because of their chemical composition, contribute to the balance of nutrients in animal food, and others give fodder a specific scent that increases animals' appetite. Examples of many such botanical species are as follow: Burnet Saxifrage (*Pimpinella saxifraga* L. – fam. *Umbeliferae*), Autumn Hawk bit (*Leontodon autumnalis* L. – fam. *Compositae*), English plantain (*Plantago lanceolata* L. – fam. *Plantaginaceae*), lady's mantle (*Alchemilla* ssp. – fam. *Rosaceae*), Meadow Salsify (*Tragopogon pratensis* L. – fam. *Compositae*), Carpathian harebell (*Campanula carpatica* Jacq. – fam. *Campanulaceae*), fireweed (*Chamaerion angustifolium* Holub. – fam. *Onagraceae*), spotted gentian (*Gentiana punctata* L. – fam. *Gentianaceae*), St Peter's wort (*Hypericum maculatum* L. – fam. *Hypericaceae*), groundsel (*Senecio subalpinus* Koch. – fam. *Compositae*), woundwort (*Solidago virgaurea* L. – fam. *Compositae*) etc.

It is notable that all these species, generically named meadow weeds are recognized as good honey and officinal plants, contributing to the production of the so much appreciated meadow honey. They are also known as herbs, conferring a distinct flavour and scent to meadow honey. According to the orders of the Minister of Agriculture, Food and Forestry no 356 and 357/2001, aligned to the provisions of community directives 96/23/CEE, 74/409/CEE and 98/179/CEE „... therapeutic, nutritional and alimentary virtues of honey depend exclusively on the botanical species it pertains to” and „...doctors and nutritionists prescribe it for various diseases according to the botanical species it was obtained from”.

Besides the fact that we possess a honey flora endowed with true officinal virtues, we also hold bio apiarian ecologic areas where practices of ecologic beekeeping could be applied with the possibility to obtain an ecologic and officinal honey.

Romanian honey is known and appreciated abroad, a proof being the medals granted along time to different varieties of Romanian honey on the occasion of their presentation within international exhibitions. But, in the present, after 15 years of transition, Romanian beekeeping shows a low productivity and little chances to impose itself on the European market. We should benefit from the fact that there are great opportunities to define some ecologic, non polluted perimeters on our country, where to apply practices of ecologic beekeeping. Thousands hectares of pastures and forests in mountainous and hilly areas could easily be certificated and then exploited as a melliferous base for the families of honey bees in the area that are employed for the production of ecologic apiarian products.

Aware of the necessity to preserve natural habitats, for the protection of wild flora and fauna, as well as of the fundamental role on the environment in preserving the ecologic balance, EU member states have signed a convention in this respect named NATURA 2000. All new member states are obliged to meet this objective. Our country will have a significant contribution to the development of the Natura 2000 ecologic network, for it is the single EU member state holding five of the 11 European bio geographic areas. The five types of regions - alpine, continental, pannonian, pontic and prairie (the last two ones being exclusively Romanian) place Romania among the most important countries within this programme. Almost all the regions in our country are potential sites. Many of them are concentrated in Transilvania, Danube Valley and Danube Delta. An area designated as Natura 2000 site equals the image of a brand.

Up to now, 400 Natura 2000 sites have been identified in Romania, whose surfaces amount to 17,84% of the national territory. The fact that these sites are recognised at European level as special natural European values will create new opportunities for the valorisation of local natural products, which could become well known brands.

Honey or any other apiarian product obtained in a Natura 2000 site or in another ecologic site will certainly have a higher price and a sure market in the EU.

All these features require a thorough knowledge of the species composing the melliferous flora on meadows and forests within hilly and mountainous areas in Romania that could become valuable resources for the economy and environment.

Summarised, the main types of meadows on hilly and mountainous area in Romania are the following:

Hilly and coline meadows cover over 2.000.000 ha, amounting to 50% of the total meadow areas in Romania. Hills and plateaux form the transition zone between plain and mountain and cover the largest surface throughout Romanian territory, laying at altitudes from 200 to 800 m.

Grassy vegetation ranges a lot because of the complexity of environmental factors. Dominant species are *graminaceae* and leguminous plants, among which the following species occur more: red clover (*Trifolium pratense* L.), yellow clover (*Trifolium campestre* Schreb.), *Trifolium hybridum* L., *Trifolium montanum* L. etc. Many other botanic species with melliferous and officinal potential are also, mainly on weedy meadows, among which the following species draw the attention Ox-eye daisy (*Crysanthemum leucanthemum* L. - sin. *Leucanthemum vulgare* Lam. - fam. *Compositae*), chicory (*Cichorium intybus* L. - fam. *Compositae*), silverweed (*Potentilla anserina* L. - fam. *Rosaceae*), Ribwort Plantain (*Plantago lanceolata* L. - fam. *Plantaginaceae*), common dandelion (*Taraxacum officinale* Web. - fam. *Compositae*), etc. Woody vegetations made up of bushes with melliferous and officinal potential occur on waste meadows and pastures, along with grassy vegetation, among which Dog Rose (*Rosa canina* L. - fam. *Rosaceae*), Singleseed Hawthorn (*Crataegus monogyna* Jacq. - fam. *Rosaceae*), Blackthorn (*Prunus spinosa* L. - fam. *Rosaceae*).

Mountain meadows cover over 900.000 ha, which represents 23% of the total permanent meadow area in our country. They are situated on different forms of relief, from altitudes of 600 to 800 m up to the plateaux storeys, to about 1.500-1.800 m. Mountain meadows range a lot in flower species depending on standing conditions and the manner of care and use.

Alpine meadows cover a significant area of about 12.000 ha and form the pastures of high mountains. The vegetation occurring on these pastures display several characteristics, namely: lack of forests, the existence of some small woody species or bushes and the great variety of meadows. Vegetation occurring in these meadows is made up of a small number of species.

The valley, riverside and basin meadows are intra-zonal meadows, spread both in the hilly and in mountainous area, where there are specific conditions, and firstly a permanent humidity regime. Riverside

meadows have a special economic and apiarian value, determined by large and constant honey yields. Favourable conditions of humidity allow the occurrence of certain mesophyll species extremely valuable as honey sources. Even if vegetal groups consist of floristic composition with a more restraint number of species, the abundance-dominance and frequency of certain species somehow balance this lack. In these meadows leguminous plants get to cover great surfaces, sometimes even up to 30-40%, being represented by *Trifolium repens* L., *Trifolium pratense* L., *Trifolium fargiferum* L. (strawberry clover), *Trifolium hybridum* L., *Lotus corniculatus* L. (bird's-foot trefoil), *Medicago lupulina* L. Species from other botanic families occur. These are represented by: Creeping Yellow Cress (*Rorippa sylvestris* Bess. - fam. *Cruciferae*), comfrey (*Symphytum officinale* L. – fam. *Boraginaceae*), water mint (*Mentha aquatica* L. – fam. *Lamiaceae*), *Potentilla reptans* L. - fam. *Rosaceae*, common dandelion (*Taraxacum officinale* L. – fam. *Compositae*). The most numerous herbs occur also on very large areas. The most frequent are: Crown Vetch (*Coronilla varia* L. – fam. *Leguminosae*), goat's rue (*Galega officinalis* L. – fam. *Leguminosae*), cursed buttercup (*Ranunculus sceleratus* L. – fam. *Ranunculaceae*) etc.

Simultaneous massive flowering of some species create true seasonal physiognomic aspects, when the meadows appear in a specific dominant colour (yellow, white, mauve, pink, violet), aspects that alternate in time and have a great practical importance for harvesting honey bees.

Likewise, the nectar and pollen reserve in hilly and mountainous areas is completed by other melliferous and officinal resources, a great part of which pertain to the forest.

Sources given by harvests and production of honey bees keeping, pertaining to the forest, are as follow:

Month	Source of harvesting	
February - March	Natural forest fauna	Cornelian Cherry Dogwood (<i>Cornus mas</i> L.) Hazel (<i>Coryllus avelana</i> L.)
April	Natural forest fauna	Goat Willow (<i>Salix caprea</i> L.) White willow (<i>Salix alba</i> L.) Sea buckthorn (<i>Hippophae rhamnoides</i> L.)
May	Natural forest fauna	Field maple (<i>Acer campestre</i> L.) Locust Tree (<i>Robinia pseudacacia</i> L.)
June	Natural forest fauna	Tilia (<i>Tilia</i> ssp.)
July	Natural forest fauna	Raspberry (<i>Rubus idaeus</i> L.) Fireweed (<i>Chamaerion angustifolium</i> L.)

Locust tree or false acacia (*Robinia pseudacacia* L. – fam. *Leguminosae*) is the most important melliferous and officinal species as melliferous potential and as the frequency of yield harvests. It gives significant quantities of monofloral honey each year. In hilly and mountainous area, acacia forms natural patches only mingled with other deciduous species, on which a successful pastoral beekeeping is practiced.

Tilia (*Tilia* ssp. – fam. *Tiliaceae*) is the second most important melliferous- officinal species in our country. Flowering occurs in 15-20 days after the flowering of locust tree ends. It forms natural patches, like:

- *pure patches*, in several centres in Banat Mountains and Central Plateau of Moldavia. The patches from Moldavia (about 22.000 ha) is considered the most important, as it insures constant harvesting, is very large and give the possibility to obtain important honey yields.

- *mingled with other deciduous species*. Tilia is mingled about 50% with hazel, dogwood, chess apple, hawthorn, oak, hornbeam which produces enough pollen and nectar to insure keeping and production harvesting. This is the reason why there are beekeepers that place the beehives adjacent to the forests in March.

Sweet chestnut (*Castanea sativa* L. – fam. *Fagaceae*) is spread under the form of:

- *pure orchards*, alike those in Maramures county, which cover an area of around 2500 ha and gives the largest sweet chestnut forest area in our country;

- *mixed orchards*, mingled with other botanic species, alike those in the sub Carpathian basin in Oltenia.

Chestnut honey has a special chemical composition being the object of many researches. There is still need of thorough studies on the importance of chestnut.

Besides the described species, there are a series of melliferous and officinal bushes occurring in our forests, which form large shrubs surrounding glades and pastures in the hilly and mountainous area. From the great number of melliferous and officinal bushes, dogwood, hazel, sea buckthorn, raspberry, fireweed and blueberry are the species that draw the attention.

Cornelian Cherry Dogwood (*Cornus mas* L. – fam. *Cornaceae*) and hazel (*Coryllus avellana* L. – fam. *Rosaceae*) form large shrubs in the forest area, providing along with herbaceous plants in the natural flora the first harvesting sources. Moreover, during summer time hazel produces the greatest quantities of manna for honey.

Sea buckthorn (*Hippophae rhamnoides* L. – fam. *Eleagnaceae*) occurs in large patches or shrubs, in the subcarpathian area in Muntenia and Moldova.

Among the good melliferous and officinal plants covering large areas, mainly in cuttings of beech and spruce forests, a special attention should be given to raspberry (*Rubus idaeus* L.), fireweed (*Chamaerion angustifolium* L.) and blueberry (*Vaccinium* ssp.).

Raspberry (*Rubus idaeus* L. – fam. *Rosaceae*) is a honey officinal plant; it is largely spread in natural patches, in the sub mountainous and mountainous are, where it forms the so called mountain raspberry canes, with great value for the beekeeping. Most of the time raspberry harvest is associated with the hay making and pastures, thus obtaining a special honey with a smooth flavour and special taste.

Fireweed (*Chamaerion angustifolium* L. – fam. *Onagraceae*) is another melliferous and officinal species highly appreciated for the hill and mountain harvesting. It occurs at altitudes of 600-700 m and even above 1.500 m.

Vaccinium plants (*Vaccinium* sp. – fam. *Ericaceae*) are mainly spread in Transilvania (Cluj, Bihor, Braşov counties), Banat (Hunedoara), Oriental Carpathians, Vrancea Mountains, Suceava and Ciucas Mountains. Their melliferous value lays not in the honey yields but in that they cover a very large area insuring an echeloned harvesting, from spring to fall. Among the melliferous *Vaccinium* species there are: bilberry (*Vaccinium myrtillus* L. – fam. *Ericaceae*), lingonberry (*Vaccinium vitis-idaea* L. – fam. *Ericaceae*) and brugo (*Calunna vulgaris* L. – fam. *Ericaceae*).

It is very important that there are mildew harvests frequently in the mountainous area, mainly in fir and spruce forests. The mildew is a sweet clear sticky matter, excreted by insects that feed with the sap of certain plants from which they retain water and proteins, eliminating all that sugar and minerals. The alimentary and therapeutic value of honeydew is superior to the honey produced from floral nectar, and this is due to it high content in minerals, yeasts and natural antibiotics. The favourable area for mildew producing insects lay in the deciduous woods in counties like Harghita, Cluj, Maramures, Alba, Hunedoara, Bistrita-Nasaud, Brasov, Cluj, Covasna, Mures, Neamţ, Arges, Bacau, as well as in deciduous woods in the hilly and mountainous area. The recent recognition of alimentary and therapeutic virtues of honeydew is a further reason to support the superior valorisation of these national values. Moreover, in the forest area mildew harvest is associated with the pasture harvest, thus achieving in favourable years great honey yields.

CONCLUSIONS

From the above mentioned information it results that:

- In the hilly and mountainous area of Romania there are meadows and forests composed of many valuable melliferous and officinal species that give the opportunity of obtaining abundant and highly qualitative honey productions.
- Besides meadows and forests, an important contribution to the melliferous potential of the hilly and mountainous area have the melliferous and officinal shrubs, melliferous and officinal crops, fruit trees, ruderal weeds etc., which balance to a large extent the seasonal distribution of nectar and pollen resources with the needs and the productive activity of honey bees.
- Considering the climate conditions and the results of local beekeepers on honey production, the hilly and mountainous region in our country could be considered as a very favourable region for beekeeping.
- According to the conditions in our country, honeydew honey harvest in hayfields and in hilly and mountainous areas is associated with other main harvests like: raspberry canes, fireweed etc.
- Honeydew honey has a nutritious and therapeutic value at least equal to floral honey, having, besides the high content of sugar and minerals a special flavour and taste.
- Beekeeping in hilly and mountainous flora, associated with honeydew honey beekeeping, contributes efficiently to the improvement of productivity per honey bee family and renders Romanian beekeeping more profitable.

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