

Ecological Characteristics of the Melliferous Flora of Počitelj

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Abstract

Melliferous flora consist of plants that bees use as a source of food, collecting nectar, pollen, honeydew from some plants, or materials for propolis. The diversity of honey flora is important for maintaining healthy apiaries, for beekeeping research, and for the production of high-quality and quantitative honey. The aim of this research was to investigate the richness and diversity of honey flora species in Počitelj (FBiH). Floristic research was conducted during the 2024 growing season, from spring to late autumn. 120 honey plants were recorded at the researched locations, classified into 44 families, of which the most numerous are the Lamiaceae family with 17 species and the Fabaceae family with 16 species. Analysis of the life forms of honey flora in the Počitelj area shows the presence of five life forms. The dominance of hemicryptophytes with 37% and phanerophytes with 34% of melliferous species is noticeable, which gives this flora a hemicryptophytic-phanerophytic character. The analysis of floral elements, or phytogeographic analysis of the melliferous flora of Počitelj, shows the presence of 18 floral groups, with the highest representation of cultivated and adventive plant species (CUAD) with 28 species (23%). This paper presents the richness of melliferous plants in the Počitelj area, which, in addition to beekeeping, has a significant impact on the use in medicinal and other traditional

purposes, and because of these values, excessive picking and endangerment of individual plants often occur.

Keyword: *melliferous flora, beekeeping area, Počitelj.*

1. Introduction

Melliferous flora is an integral part of the flora of an area and is related to the climatic conditions of that area. The diversity of melliferous flora is of exceptional importance for beekeeping, from the strengthening of bee colonies, to greater diversity and quantity of honey. Amsalu et al. (2003) state that the production of honey and other bee products depends on the beekeeping area and on the availability of floral resources (bee fodder). Plant species that provide food for bees with their flowers, juices and resins and create conditions for the life, work and development of the bee colony constitute Melliferous plants (Jašmak, 1980). Adequate nectar and pollen resources are crucial for maintaining the health of honey bees (Michener, 2007).

The historical urban area of Počitelj is located on the left bank of the Neretva River, on the main road Mostar - Metković, south of Mostar, in the municipality of Čapljina. The climatic characteristics of the Čapljina municipality and its immediate surroundings, which also includes Počitelj, can be generalized based on data for Čapljina by the following determining factors: proximity to the sea, relatively low altitude, karst character of the area, as well as hydrographic conditions of certain parts of the area.

The entire area of the Čapljina municipality is characterized by a Mediterranean climate. The characteristics of this climate are long, warm summers and mild and short winters. The average annual temperature in the Mediterranean climate zone is over 14°C. There are over 200 sunny days in this area annually, which means that the total annual sunshine is over 2000 hours.

The Mediterranean climate zone is characterized by two periods: an extremely dry period (June, July, August) and a period with large amounts of precipitation (November and December) (Puljić, 2012).

Due to the long period of availability of diverse Melliferous flora and a favorable climate, the Počitelj area has exceptional potential for the development of beekeeping. In addition to beekeeping, honey flora has a significant impact on medicinal and other traditional uses, and because of these values, excessive plant collection and endangerment of certain plants often occur.

The aim of this work was to list the honey flora in the Počitelj area, determine the life form and origin of the honey flora.

2. Material and methods

Wild honey flora was investigated in the area of Počitelj. Floristic research was carried out during the growing season of 2024, from spring to late autumn.

Processing and determination of plant species was carried out using the following floristic works: *Flora Europaea* I-V (Tutin, ed., 1964-1980, 1993), *Flora of Bosnia and Herzegovina* (Beck, 1903, 1906-1923), *Flora of the SR Serbia* I-IX (Josifović, ed., 1970-1977), *Flora of Croatia* (Domac, 1994), *Ikonographie der Flora des Südöstlichen Mitteleuropa* (Javorka et Csapody, 1979) and *Flora Italiana* (Fiori et Paoletti, 1921).

The nomenclature of plant taxa is harmonized according to the work *Flora Europaea* (Tutin et al. 1964–1980, 1993), then the *Flora Croatica Database* (Nikolić, 2015), and only partly according to Pignatti (1982) and Trinajstić (1975–1986). The classification of honey plants is determined according to Šimić (1980), Bačić and Sabo (2007), Bučar (2008) and Umeljić (2013, 2015). Data on life forms are defined according to Raunkiaer (1934), and within the framework of this work, a modification of the life forms listed for the wider area of the Balkan Peninsula is applied: Pignatti (1982), Diklić (1984), Pignatti et al. (2005), Guarino et al. (2012) and Nikolić (2020a, 2020b). For each listed melliferous plant species, the abbreviation of the corresponding life form is given: P – phanerophyte, Ch – hamephyte, H – hemicytrophite, G – geophyte, T – therophyte. Pyšek et al. (2002) was used to determine the origin of the melliferous flora (Table 1.).

3. Results and discussion

In the investigated area of Počitelj, 120 melliferous plants were recorded, classified into 44 families. The most numerous families are Lamiaceae with 17 species and Fabaceae with 16 species. (Table 1.).

Zima and Štefanić (2018) state that the most represented melliferous plant species is Lamiaceae, in which there are almost no plant species that are not melliferous plant. Very important melliferous families are willows (Salicaceae), roses (Rosaceae), buttercups (Fabaceae), sedges (Asteraceae and Cichoriaceae) and crucifers (Brassicaceae). Maslo and Boškailo (2018) listed 616 plant species in the area of Počitelj.

Table 1. Taxonomic and phytogeographical analysis of melliferous flora of Počitelj (Bosnia and Herzegovina), the origin of the melliferous flora Pyšek et al. (2002): Circum-Mediterranean plants (CIME), West-Mediterranean plants (WEME), East-Mediterranean plants (EAME), Illyrian-South European plants (ILSE), Illyrian-Adriatic endemic plants (ILAE), Illyrian-Apennine plants (ILAP), South European-Mediterranean plants (SEME), European Mediterranean plants (EUME), Mediterranean-Pontic plants (MEPO), South European-Pontic plants (SEPO), Balkanic-Apennine plants (BAAP), South European-continental plants (SECO), European floral element (EURO), Central European floral element (CEEU), Southeast European floral element (SEEU), Eurasian floral element (EUAS), Widespread plants (WISP), Cultivated & adventitious plants (CUAD)

Species name	Family	Life form	Floral element
<i>Acer campestre</i> L.	<i>Aceraceae</i>	P	EURO
<i>Acer monspessulanum</i> L.	<i>Aceraceae</i>	P	SEME
<i>Acer negundo</i> L.	<i>Aceraceae</i>	P	CUAD
<i>Ailanthus altissima</i> (Mill.) Sw.	<i>Simaroubaceae</i>	P	CUAD
<i>Allium cepa</i> L.	<i>Liliaceae</i>	G	CUAD
<i>Amorpha fruticosa</i> L.	<i>Fabaceae</i>	P	CUAD
<i>Anchusa arvensis</i> (L.) M.Bieb.	<i>Boraginaceae</i>	T	EURO
<i>Anchusa italica</i> Retz.	<i>Boraginaceae</i>	H	SEME
<i>Anchusa officinalis</i> L.	<i>Boraginaceae</i>	H	EURO
<i>Anchusella cretica</i> (Mill.) Bigazzi, E. Nardi et Salvi	<i>Boraginaceae</i>	H	EURO
<i>Arbutus unedo</i> L.	<i>Ericaceae</i>	P	CIME
<i>Arctium lappa</i> L.	<i>Asteraceae</i>	H	EUAS
<i>Arctium minus</i> Bernh.	<i>Asteraceae</i>	H	CIME
<i>Barbarea vulgaris</i> R. Br.	<i>Brassicaceae</i>	H	WISP
<i>Bellis perennis</i> L.	<i>Asteraceae</i>	H	EURO
<i>Calamintha glandulosa</i> (Req.) Benth.	<i>Lamiaceae</i>	H	SEPO
<i>Calamintha nepetoides</i> Jord.	<i>Lamiaceae</i>	H	SEPO
<i>Calendula officinalis</i> L.	<i>Asteraceae</i>	T	CUAD
<i>Canabis sativa</i> L.	<i>Cannabaceae</i>	T	CUAD
<i>Carpinus orientalis</i> Mill	<i>Corylaceae</i>	P	ILSE
<i>Cercis siliquastrum</i> L.	<i>Fabaceae</i>	P	CUAD
<i>Cichorium intybus</i> L.	<i>Asteraceae</i>	H	WISP
<i>Citrullus lanatus</i> (Thunb.) Mansf	<i>Cucurbitaceae</i>	T	CUAD
<i>Clematis vitalba</i> L.	<i>Ranunculaceae</i>	P	EURO
<i>Colchicum autumnale</i> L.	<i>Colchicaceae</i>	G	CEEU
<i>Colutea arborescens</i> L.	<i>Fabaceae</i>	P	CIME
<i>Cornus mas</i> L.	<i>Cornaceae</i>	P	SECO
<i>Crataegus monogyna</i> Jacqu.	<i>Rosaceae</i>	P	EUAS
<i>Cucumis melo</i> L.	<i>Cucurbitaceae</i>	T	CUAD
<i>Cucurbita pepo</i> L.	<i>Cucurbitaceae</i>	T	CUAD
<i>Cupressus sempervirens</i> L.	<i>Cupressaceae</i>	P	CUAD
<i>Daucus carota</i> L. subsp. <i>carota</i>	<i>Apiaceae</i>	H	WISP
<i>Diplotaxis tenuifolia</i> (D.) DC.	<i>Brassicaceae</i>	H	WISP
<i>Echium italicum</i> L.	<i>Boraginaceae</i>	T	CIME
<i>Echium vulgare</i> L.	<i>Boraginaceae</i>	H	EURO
<i>Eryngium campestre</i> L.	<i>Apiaceae</i>	H	SEME
<i>Fraxinus ornus</i> L.	<i>Oleaceae</i>	P	SEME

<i>Galanthus nivalis</i> L.	<i>Amaryllidaceae</i>	G	EUAS
<i>Genista sylvestris</i> Scop. subsp. <i>dalmatica</i> (Bartl.) H. Lindb.	<i>Fabaceae</i>	Ch	ILAE
<i>Geranium robertianum</i> L.	<i>Geraniaceae</i>	T	WISP
<i>Hedera helix</i> L.	<i>Araliaceae</i>	P	EURO
<i>Helianthus annuus</i> L.	<i>Asteraceae</i>	T	CUAD
<i>Helianthus tuberosus</i> L.	<i>Asteraceae</i>	G	CUAD
<i>Hypericum perforatum</i> L.	<i>Clusiaceae</i>	H	WISP
<i>Lamium amplexicaule</i> L.	<i>Lamiaceae</i>	T	EUAS
<i>Lamium maculatum</i> L.	<i>Lamiaceae</i>	H	EUAS
<i>Lamium purpureum</i> L.	<i>Lamiaceae</i>	T	EUAS
<i>Lathyrus latifolius</i> L.	<i>Fabaceae</i>	H	SEME
<i>Lathyrus tuberosus</i> L.	<i>Fabaceae</i>	H	EUAS
<i>Laurus nobilis</i> L.	<i>Lauraceae</i>	P	CUAD
<i>Linaria genistifolia</i> (L.) Mill. subsp. <i>dalmatica</i> (L.) Maire & Petitm.	<i>Scrophulariaceae</i>	H	BAAP
<i>Linaria vulgaris</i> Miller.	<i>Scrophulariaceae</i>	H	EUAS
<i>Lotus corniculatus</i> L. subsp. <i>hirsutus</i> Rothm.	<i>Fabaceae</i>	H	SEME
<i>Lupinus micranthus</i> Guss.	<i>Fabaceae</i>	T	SEEU
<i>Lythrum salicaria</i> L.	<i>Lythraceae</i>	H	WISP
<i>Malva sylvestris</i> L.	<i>Malvaceae</i>	H	WISP
<i>Marrubium incanum</i> Desr.	<i>Lamiaceae</i>	H	ILAP
<i>Marrubium vulgare</i> L.	<i>Lamiaceae</i>	H	WISP
<i>Medicago falcata</i> L.	<i>Fabaceae</i>	H	EUAS
<i>Medicago lupulina</i> L.	<i>Fabaceae</i>	T	WISP
<i>Medicago sativa</i> L.	<i>Fabaceae</i>	H	CUAD
<i>Melia azedarach</i> L.	<i>Meliaceae</i>	P	CUAD
<i>Melilotus albus</i> Medik	<i>Fabaceae</i>	T	EUAS
<i>Melissa officinalis</i> L.	<i>Lamiaceae</i>	H	EAME
<i>Mentha pulegium</i> L.	<i>Lamiaceae</i>	H	EUME
<i>Mentha spicata</i> L.	<i>Lamiaceae</i>	H	WISP
<i>Morus alba</i> L.	<i>Moraceae</i>	P	CUAD
<i>Morus nigra</i> L.	<i>Moraceae</i>	P	CUAD
<i>Odontites vulgaris</i> Moench	<i>Scrophulariaceae</i>	T	WISP
<i>Onopordum illyricum</i> L.	<i>Asteraceae</i>	H	CIME
<i>Origanum vulgare</i> L.	<i>Lamiaceae</i>	H	EUAS
<i>Paliurus spina – christi</i> Mill.	<i>Rhamnaceae</i>	T	ILSE
<i>Papaver rhoeas</i> L.	<i>Papaveraceae</i>	T	CUAD
<i>Parthenocissus quinquefolia</i> (L.) Planchon.	<i>Vitaceae</i>	P	CUAD
<i>Petteria ramentacea</i> (Sieb) Presl.	<i>Fabaceae</i>	P	ILAE
<i>Pistacia terebinthus</i> L.	<i>Anacardiaceae</i>	P	CIME
<i>Plantago lanceolata</i> L.	<i>Plantaginaceae</i>	H	WISP
<i>Plantago major</i> L. subsp. <i>major</i>	<i>Plantaginaceae</i>	H	WISP
<i>Plantago media</i> L.	<i>Plantaginaceae</i>	H	EUAS

<i>Populus alba</i> L.	<i>Salicaceae</i>	P	EUAS
<i>Populus nigra</i> L.	<i>Salicaceae</i>	P	WISP
<i>Portulaca oleracea</i> L.	<i>Portulacaceae</i>	T	CUAD
<i>Prunus avium</i> L.	<i>Rosaceae</i>	P	EUAS
<i>Prunus cerasifera</i> Ehrh.	<i>Rosaceae</i>	P	CUAD
<i>Prunus dulcis</i> (Mill.) D.A.Webb	<i>Rosaceae</i>	P	CUAD
<i>Prunus mahaleb</i> L.	<i>Rosaceae</i>	P	SEPO
<i>Prunus persica</i> (L.) Batsch	<i>Rosaceae</i>	P	CUAD
<i>Prunus spinosa</i> L.	<i>Rosaceae</i>	P	EUAS
<i>Prunus webbii</i> (Spach) Vierh.	<i>Rosaceae</i>	P	EAME
<i>Quercus pubescens</i> Willd.	<i>Fagaceae</i>	P	SEPO
<i>Reseda lutea</i> L.	<i>Resedaceae</i>	H	WISP
<i>Reseda phyteuma</i> L.	<i>Resedaceae</i>	T	SEME
<i>Robinia pseudoacacia</i> L.	<i>Fabaceae</i>	P	CUAD
<i>Rosa canina</i> L.	<i>Rosaceae</i>	P	WISP
<i>Rosmarinus officinalis</i> L.	<i>Lamiaceae</i>	P	CUAD
<i>Salix alba</i> L.	<i>Salicaceae</i>	P	EUAS
<i>Salvia officinalis</i> L.	<i>Lamiaceae</i>	Ch	EUME
<i>Satureja montana</i> L. ssp. <i>montana</i>	<i>Lamiaceae</i>	Ch	MEPO
<i>Scilla bifolia</i> L.	<i>Liliaceae</i>	G	SEME
<i>Sorbus domestica</i> L.	<i>Rosaceae</i>	P	CIME
<i>Tamarix dalmatica</i> Baum	<i>Tamaricaceae</i>	P	ILSE
<i>Taraxacum officinale</i> Webber	<i>Asteraceae</i>	H	WISP
<i>Teucrium chamaedrys</i> L.	<i>Lamiaceae</i>	Ch	SEPO
<i>Teucrium polium</i> L.	<i>Lamiaceae</i>	Ch	WEME
<i>Thymus longicaulis</i> C.Presl	<i>Lamiaceae</i>	Ch	ILAP
<i>Tragopogon pratensis</i> L. subsp. <i>orientalis</i> (L.) Čelak.	<i>Asteraceae</i>	H	EUAS
<i>Trifolium pratense</i> L. subsp. <i>pratense</i>	<i>Fabaceae</i>	H	EUAS
<i>Trifolium repens</i> L. subsp. <i>repens</i>	<i>Fabaceae</i>	H	WISP
<i>Ulmus minor</i> Miller	<i>Ulmaceae</i>	P	WISP
<i>Verbascum phlomoides</i> L.	<i>Scrophulariaceae</i>	H	EUME
<i>Verbena officinalis</i> L.	<i>Verbenaceae</i>	T	WISP
<i>Veronica hederifolia</i> L.	<i>Scrophulariaceae</i>	T	EUAS
<i>Veronica persica</i> Poir.	<i>Scrophulariaceae</i>	T	CUAD
<i>Viola alba</i> Besser	<i>Violaceae</i>	H	SEME
<i>Viola kitaibeliana</i> Schultes	<i>Violaceae</i>	T	CIME
<i>Viola odorata</i> L.	<i>Violaceae</i>	H	EURO
<i>Viscum album</i> L. subsp. <i>album</i>	<i>Santalaceae</i>	H	EUAS
<i>Vitex agnus – castus</i> L.	<i>Verbenaceae</i>	P	CIME
<i>Vitis vinifera</i> L. ssp. <i>sylvestris</i> (Gm.) Hegi	<i>Vitaceae</i>	P	SEME
<i>Zea mays</i> L.	<i>Poaceae</i>	T	CUAD

Maslo and Boškailo (2018) based their work on endangered plant species and on plant species that are ruderal, weedy and foreign species and clearly reveal habitat

disturbance. One of these plants is *Ailanthus altissima* (Mill.) Swingle, which, apart from being on the list of invasive alien species of concern in the EU, is a good honey plant. Analysis of life forms of the melliferous flora in the area of Počitelj shows the presence of five life forms. The dominance of hemicryptophytes with 37% and phanerophytes with 34% of melliferous species is noticeable, which gives this flora a hemicryptophytic-phanerophytic character (Figure 1.). Of the other life forms, the presence of therophytes is also significant, representing 20% of the total number of species in the melliferous flora of Počitelj. The relatively large proportion of phanerophytes indicates the process of degradation of the studied rocky pastures, or the process of overgrowing of pasture areas with macchia (Ljubičić, 2012). The presence of hemicryptophytes is common for pasture flora. Britvec et al. (2013) listed a total of 56 melliferous plant species in the area of the islands of Cres, Krk and Pag, and phanerophytes and hemicryptophytes also predominated.

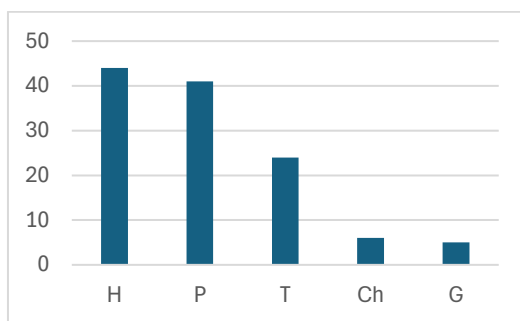


Figure 1. Representation of life forms in the melliferous flora of Počitelj.

The analysis of floral elements, or phytogeographic analysis of the melliferous flora of Počitelj, shows the presence of 18 floral groups (according to Pyšek et al., 2002), with the highest representation of cultivated and adventitious plant species (CUAD) with 28 species (23%). This is followed by plants of wide distribution (WISP) with 21 species (18%). The Eurasian floral element (EUAS) with 20 species (17%), the South European-Mediterranean floral element is represented by 10 species (8%), and the Circum-Mediterranean with 9 species. Species of Circumholoarctic distribution, Central European, Illyrian-Balkan and Southeast European distribution are also represented (Table 1, Figure 2).

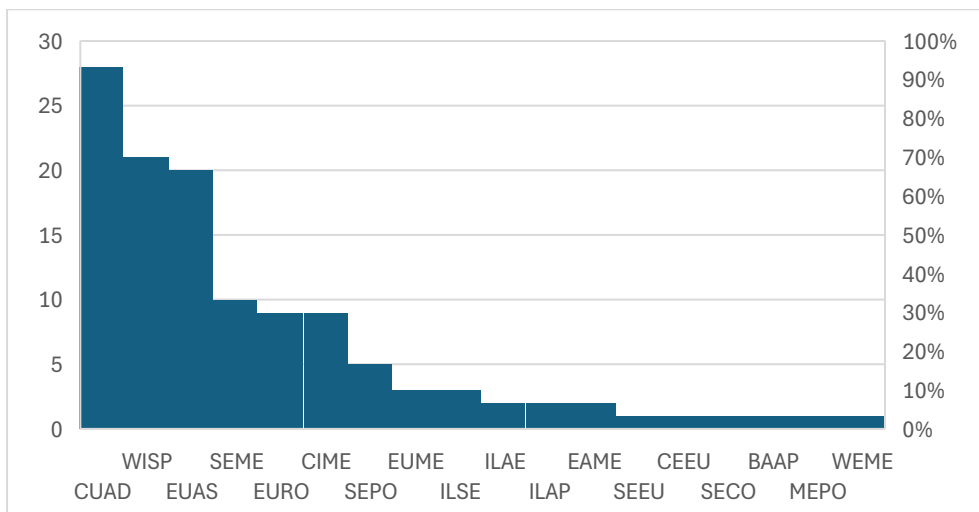


Figure 2. Floral elements in the honey flora of Počitelj.

Among the melliferous plants in the Počitelj area (Table 1) from the Lamiaceae family, sage (*Salvia officinalis* L.) stands out, whose honey has a specific aroma and medicinal properties. Sage is a heliophyte and warm weather with little humidity in the air and plenty of sunlight suits it, while changeable, rainy and cold, and too dry and windy weather does not suit it. Its habitats are endangered due to the overgrowth of areas with undergrowth and macchia (Šimić, 1980). The flowering of an individual bush lasts up to twenty days, from April to the end of July. In addition to sage, significant melliferous plants from the Lamiaceae family are thyme (*Thymus longicaulis* C.Presl), rosemary (*Rosmarinus officinalis* L.) and mint (*Mentha* spp). The second most numerous family is Fabaceae, and the most important melliferous plants are white and red clover, which are the source of very high-quality meadow honey. The species *Trifolium repens* L. (white clover) is visited by bees throughout the flowering period, which begins in May and lasts until the first frosts. A bee needs to visit 580 white clover flowers to collect one load of pollen (Šimić, 1980). Dujmović Purgar and Hulina (2007) list high-quality forage legumes such as clover and alfalfa, which make up a large part of the meadows of the Plešivica Hills and also have a melliferous value. Acacia (*Robinia pseudoacacia* L.) has an extremely important role as a honey-bearing plant. Although it is an invasive plant species, acacia honey, known for its light yellow color, very mild floral aroma reminiscent of the smell of acacia, mild and delicate taste with pronounced antibacterial properties, is one of the highest quality and most valued types of honey. The short flowering period of the acacia tree, which lasts about 12 days, depending on the weather (Šimić, 1985), not only provides raw materials for honey, but its flowers can also be used to prepare tea and syrup. In addition to the plants listed so far, numerous other plants from the

Fabaceae, Asteraceae and Rosaceae families play an important role in the diet of bees and other insects and in the production of honey, representing a significant source of nectar and pollen. Among them, the dandelion (*Taraxacum officinale* Webber) is a very good honey plant that blooms all year round and provides abundant pollen and is a source of food for bees.

4. Conclusion

The flora research in the area of Počitelj confirmed its exceptional value as one of the rare urban environments with preserved biodiversity in Bosnia and Herzegovina. The results of the work indicate the wealth of honey plants in the area of Počitelj. At the researched locations, 120 taxa of melliferous plants were recorded, classified into 44 families. The floristic composition is dominated by the Lamiaceae family with 17 species and the Fabaceae family with 16 species, which indicates their importance in bee nutrition. The biological spectrum is dominated by hemicryptophytes with 37% and phanerophytes with 34% of honey-bearing species, which gives this flora a hemicryptophytic-phanerophytic character. A significant proportion of phanerophytes indicates the degradation process of the studied stony pastures, i.e. the process of overgrowth of pasture areas in maquis. Numerous indigenous species are well adapted to the habitat, and their use contributes to the preservation of the ambient value of the area and the preservation of biodiversity.

5. References

1. Amsalu, B., Nuru, A., Radloff, H. (2003) Multivariate morphometric analysis of honeybees in the Ethiopian region. *Apidologie*, 35: 71-81.
2. Beck, G. (1903): Flora Bosne, Hercegovine i Novopazarskog Sandžaka. I dio: Gymnospermae, Monocotyledone. Zemaljska štamparija, Sarajevo.
3. Beck, G. (1906-1923): Flora Bosne, Hercegovine i Novopazarskog Sandžaka. II dio. Zemaljska štamparija, Sarajevo.
4. Britvec, M., Ljubičić, I., Šimunić, R. (2013) Medonosno bilje kamenjarskih pašnjaka otoka krka, cresa i paga. *Agronomski glasnik*, 1:31-42.
5. Bačić, T., Sabo, M. (2007) Najvažnije medonosne biljke u Hrvatskoj. Grafika d. o. o., Osijek.
6. Bučar, M. (2008) Medonosno bilje kontinentalne Hrvatske. Matica hrvatska Petrinja.

7. Diklić, N. (1984). Life forms of plant species and biological spectrum of the flora of the SR Serbia. In: Sarić, M. (ed.): Vegetation of the SR Serbia I. SANU, Belgrade, pp. 291–316.
8. Domac, R. (1994) Flora Hrvatske. Priručnik za određivanje bilja, Školska knjiga, Zagreb, str. 504.
9. Dujmović Purgar D., Hulina N. (2007) Medonosne biljne vrste Plešivičkog prigorja (SZ Hrvatska). Agronomski glasnik, 69(1): 3-22.
10. Fiori, A., Paoletti, G. (1921): Flora Italiana, Illustrata. Sancasciano val di Pesa, Stab. Tipo-Lotografico Frtelli Stianti.
11. Guarino, R., Domina, G., Pignatti, S. (2012) Ellenberg indicator values for the Flora of Italy – first update: Pteridophyta, Gymnospermae and Monocotyledoneae. Flora Mediterranea, 22: 197–209.
12. Javorka, S., Csapody, V. (1979) „Iconographie der Flora des Südöstlichen Mitteleuropa“ Gustav Fischer Verlag, Stuttgart.
13. Josifović, M. (1970-1977): Flora SR Srbije I-IX. Srpska akademija nauka i umjetnosti, Beograd.
14. Michener, C.D. (2007) The bees of the world. The Johns Hopkins University Press, Baltimore and London, USA and UK, 12-19.
15. Nikolić, T. (2020a) Flora Croatica – vascular flora of the Republic of Croatia. Identification keys with supporting data: Equisetidae, Lycopodiidae, Ophyoglossidae, Polypodiidae, Cycadidae, Ginkgooidae, Gnetidae, Pinidae, Magnoliidae – families A–FAB. Volume 2, Alfa d. d., Zagreb.
16. Nikolić, T. (2020b) Flora Croatica – vascular flora of the Republic of Croatia. Keys for determination with accompanying data: Magnoliidae – families FAG–ZYG, Volume 3, Alfa d. d., Zagreb.
17. Pignatti, S. (1982) Flora d'Italia. Volume II, Edagricole, Bologna.
18. Pignatti, S., Menegoni, P., Pietrosanti, S. (2005) Biondicazione attraverso le piante vascolari. Valori di indicazione secondo Ellenberg (Zeigerwerte) per le specie della Flora d'Italia. Braun-Blanquetia, 39: 1–97.
19. Šimić, F. (1980) Naše medonosno bilje. Znanje, Zagreb.
20. Umeljić, V. (2013) Atlas medonosnog bilja 1. Kragujevac.
21. Umeljić, V. (2015) Atlas medonosnog bilja 2. Kragujevac.