Acta Veterinaria (Beograd), Vol. 44. No. 4, 245—252, 1994.

UDK 619:632.799.084.522

APIFLORA OF SOME MESOPHYLOUS MEADOWS IN THE VELIKA MORAVA VALLEY

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(Received, 20. January 1994.)

In this work the melliferous flora in four mesophylous meadow phytocoenoses in the Velika Morava valley is presented. By analysing the presence of melliferous species in each meadow community (number and coverage), as well as by the determining the intensity of nectar production of each melliferous species in the community, the coenotic coefficient of nectar production of the plant community was obtained, and it showed its significance for bee pasture. Simultaneously the percentage of melliferous species was estimated in each investigated community. Ranking the phytocoenoses in regard to their significance for bee pasture was carried out on the basis of the coenotic coefficient of melliferousness.

Key words: honey plants, nectar, meadow phytocoenosis

INTRODUCTION

The members of the department of botany in recent years have been engaged in investigations of the chorology and quality of apiflora in meadow, meadow-pasture and ruderal communities in the territory of Serbia (Blaženčić 1987, Danon and Blaženčić 1987a, 1987v, 1988a, 1988b, Danon, Blaženčić, Zonjić 1990a, 1990b, Zonjić, Ivanković, Petković 1991).

In this work the melliferous flora which was registered in phytocoenological surveys of some valley meadows is presented: Agrostidetum albae at localities near the villages of Lanište and Bukovača; Poeto-Alopecuretum pratensis which was spread over a large area near the villages of Jovanovac, Sarakovo and Đurđevo, and Festuco-Hordetum secalini and Bromo-Cynosuretum cristati around Kragujevac. The last community was noticed near the villages of Đurđinci, Veliki Lug and Rabrovac. These four mesophylous meadow phytocoenoses at the reported localities were separated by Jovanovići-Dunjić (1965) in the Velika Morava valley.

MATERIALS AND METHODS

The coenotic coefficient of nectar production is the most realistic index of the significance of a certain plant community and it includes several parameters:

The index of nectar production (Inp) or quality of a plant species is graded by numerals from 1 to 4 (1 is for a poor melliferous species, 2 for good, 3 for very good and 4 for excellent.) The data on the quality of the species are presented according to the method of Jašmak (1980) and Lovašen-Ebercharot, Šegulja and Krga (1989).

The abundance of melliferous species in a plant community is determined on the basis of a combined estimation of number and coverage according to the method of Braun-Blanquet (1928). The mean value of number and coverage of species was calculated from the phytocoenological table, and in this way a real value of the abundance of melliferous species in the analysed communities was obtained. These values, according to the above mentioned author, ranged from 1 to 5. If a species is only present in a community and designated within the phytocoenological survey, in our work it is valued by 0,5.

After that, the coefficient of nectar production (Cnp) for each melliferous species in the community was calculated, and that coefficient represents the product of the mean value of number and coverage (nc) and the index of nectar production (Inp). The sum of all individual Cnp in a single phytocoenosis represents the coenotic coefficient of nectar production (CCnp) of the community.

RESULTS AND DISCUSSION

In the community Agrostidetum albae prov., of the total of 59 species (table 1.), 26 were melliferous ones, making up 44,07%.

Table 1. Melliferous species in the community Agrostidetum albae prov.

Species	Inp	nc	Cnp
Trifolium resupinatum	4	0,71	2,84
Trifolium patens	4	0,18	0,72
Lathyrus pratensis	4	0,05	0,20
Trifolium repens	4	0,13	0,52
Taraxacum officinale	4	0,11	0,44
Lythrum salicaria	4	0,61	2,44
Trifolium hybridum	4	0,13	0,52
Lathyrus megalanthys	4	0,11	0,44
Rubus caesius	4	0,05	0,20
Lotus corniculatus ssp. tennuifolius	3	0,13	0,39
Centaurea jacea	3	0,08	0,24
Mentha pulegium	3	0,74	2,22
Plantago major	3	0,13	0,39
Symphytum officinale	3	0,26	0,79
Althaea officinalis	3	0,11	0,33
Stachys palustris	3	0,13	0,39
Cychorium intibus	3	0,05	0,15
Potentilla reptans	2	1,34	2,68
Brunella vulgaris	2	0,13	0,26
Lysimachia nummularia	2	0,08	0,16
Lathyrus aphaca	2	0,13	0,26
Cirsium arvence	2	0,20	0,40
Verbena officinalis	2	0,08	0,16
Alisma plantago-aquatica	2	0,05	0,10
Ranunculus repens	1	1,03	1,03
Iris pseudoacorus	1	0,05	0,05

The coenotic coefficient of nectar production of this community was found to be 18,32.

In the community Poeto-Alopecuretum pratensis R. Jov., out of the total of 99 species (table 2.), 43 were melliferous ones, making up 43, 43%.

Table 2. Melliferous species in the community Poeto-Alopecuretum pratensis R. Jov. (1957)

Species	Inp	nc	Cnp
Trifolium resupinatum	4	1,23	4,92
Taraxacum officinale	4	0,66	2,64
Lotus corniculatus ssp. tenuifolius	4	0,35	1,40
Lathyrus pratensis	4	0,34	1,36
Trifolium repens	4	0,16	0,64
Trifolium patens	4	0,27	1,08
Stachys officinalis	4	0,02	0,08
Lathyrus tuberosus	4	0,27	1,08
Lythrum salicaria	4	0,22	0,88
Rubus caesius	4	0,12	0,48
Trifolium hybridum	4	0,23	0,92
Trifolium pratense	3	0,16	0,48
Centaurea jacea ssp. angustifolia	3	0,04	0,12
Ononis spinosa	3	0,04	0,12
Cirsium canum	3	0,04	0,12
Lythrum virgatum	3	0,10	0,30
Plantago media	3	0,02	0,06
Cichorium intybus	3	0,24	0,72
Symphytum officinale	3	0,17	0,51
Althea officinalis	3	0,05	0,15
Mentha pulegium	3	0,46	1,38
Trifolium campestre	3	0,04	0,12
Dipsacus silvestris	3	0,05	0,15
Stachys palustris	3	0,05	0,15
Plantago major	3	0,04	0,12
Mentha longifolia	3	0,09	0,27
Potentilla reptans	2	1,12	2,24
Lysimachia numularia	2	0,45	0,90
Leucanthemum vulgare	2	0,14	0,28
Brunella vulgaris	2	0,13	0,26
Bellis perennis	2	0,04	0,08
Filipendula hexapetala	2	0,06	0,12
Rosa gallica	2	0,02	0,04
Vicia cracca	2	0,09	0,18
Vicia sativa	2	0,05	0,10
Lathyrus aphaca	2	0,04	0,08
Verbena officinalis	2	0,06	0,12
Cirsium arvense	2	0,06	0,12
Tragopogon pratensis	1	0,33	0,33
Ranunculus repens	1	0,65	0,65
Achillea milefolium ssp. collina	1	0,05	0,05
Vicia hirsuta	1	0,12	0,12
Galium verum	1	0,05	0,05

The coenotic coefficient of nectar production (cCnp) for this community was found to be 25,97.

In the community Festuceto-Hordetum secalinii R. Jov., out of the total of 107 species (table 3.), 49 were melliferous ones, making up 45,79%.

Table 3. Melliferous species in the community Festuceto-Hordetum secalinii R. Jov. 1957.

Species	Inp	nc	Cnp
Trifolium resupinatum	4	0,93	3,7
Taraxacum officinale	4	0,9	3,6
Trifolium patens	4	0,73	2,92
Lotus corniculatus	4	0,52	2,08
Lathyrus pratensis	4	0,35	1,4
Trifolium repens	4	0,42	1,68
Stachys officinalis	4	0,07	0,28
Lythrum salicaria	4	0,2	0,8
Trifolium hybridum	4	0,06	0,24
Lathyrus tuberosus	4	0,09	0,36
Trifolium incarnatum	4	0,05	0,2
Trifolium pratense	3	0,34	1,02
Ononis spinosa	3	0,05	0,15
Centaurea jacea ssp. angustifolia	3	0,11	0,33
Althaea officinalis	3	0,04	0,12
Cirsium canum	3	0,08	0,24
Symphytum officinale	3	0,08	0,24
Mentha pulegium	3	0,29	0,87
Plantago major	3	0,14	0,42
Cichorium intybus	3	0,21	0,63
Trifolium campestre	3	0,14	0,42
Trifolium pallidum	3	0,06	0,18
Ajuga genevensis	3	0,03	0,09
Plantago media	3	0,06	0,18
Stachys palustris	3	0,04	0,12
Mentha longifolia	3	0,03	0,09
Clematis integrifolia	2	0,48	0,96
Potentilla reptans	2	1,2	2,4
Lysimachia nummularia	2	0,55	1,1
Brunela vulgaris	2	0,26	0,52
Plantago lanceolata	2	0,08	0,16
Vicia sativa	2	0,15	0,3
Filipendula hexapetala	2	0,11	0,22
Vicia tetrasperma	2	0,03	0,06
Cirsium arvense	2	0,1	0,2
Allium sphaerocephalum	2	0,08	0,16
Ranunculus repens	1	0,66	0,66
Leucojum aestivum	1	0,41	0,41
Tragopogon pratensis	1	0,13	0,13
Achillea millefolium	1	0,1	0,1
Chrysanthemum leucanthemum	1	0,02	0,02
Pedicularis palustris	1	0,04	0,04
Lathyrus nissolia	1	0,16	0,16
Myosotis hispidus	1	0,1	0,1
Lathyrus aphaca	1	0,03	0,03
Galium verum	1	0,03	0,03
Fragaria vesca	1	0,03	0,03
Convolvulus arvensis	1	0,05	0,05
Veronica verna	1	0,09	0,09

The coenotic coefficient of nectar production (CCnp) in this community was found to be 30,17.

In the community Brometo-Cynosuretum cristati H-ić out of the total of 75 species (table 4.), 34 were melliferous ones, making up 45,33%.

Table 4. Melliferous species in the community Brometo-Cynosuretum cristati H-ić (1930)

Species	Inp	nc	Cnp
Stachys officinalis	4	0,32	1,28
Trifolium patens	4	2,09	8,36
Trifolium resupinatum	4	0,68	2,72
Taraxacum officinale	4	0,50	2,0
Lathyrus pratensis	4	0,50	2,0
Trifolium repens	4	0,14	0,56
Lotus corniculatus ssp. tenuifolius	4	0,14	0,56
Trifolium incarnatum	4	0,36	1,44
Lythrum salicaria	4	0,14	0,56
Trifolium hybridum	4	0,14	0,56
Trifolium pratense	3	0,45	1,35
Ononis spinosa	3	0,55	1,65
Daucus carota	3	0,18	0,54
Centaurea jacea ssp. angustifollia	3	0,23	0,69
Trifolium campestre	3	0,32	0,96
Cirsium canum	3	0,59	1,77
Ajuga reptans	3	0,14	0,42
Cichorium intybus	3	0,23	0,69
Ajuga genevensis	3	0,18	0,54
Vicia grandiflora	3	0,09	0,27
Leucanthemum vulgare	2	0,36	0,72
Potentilla reptans	2	0,64	1,28
Brunella vulgaris	2	0,23	0,46
Bellis perennis	2	0,14	0,28
Filipendula hexapetalla	2	0,32	0,68
Clematis integrifolia	2	0,32	0,64
Vicia sativa	2	0,23	0,46
Vicia tetrasperma	2	0,09	0,18
Achillea millefolium ssp. collina	1	0,64	0,64
Campanula patula	1	0,14	0,14
Galium verum	1	0,36	0,36
Tragopogon pratensis	1	0,18	0,36
Vicia hirsuta	1	0,36	0,36
Fragaria vesca	1	0,14	0,14

The coenotic coefficient of nectar production (CCnp) for this community was found to be 35,62.

Analysis of the coenotic coefficient of nectar production (CCnp) and the proportional participation of melliferous flora in each meadow community (%mf) provided a picture of their significance for bee pasture (table 5.).

Table 5. Investigated communities in Velika Morava valley

communities	CCnp	% mf
Brometo-Cynosuretum cristati prov.	35,62	45,33
Festuco-Hordetum secalini R. Jov. (1957)	30,17	45,79
Poeto-Alopecuretum pratensis R. Jov. (1957)	25,97	43,43
Agrostidetum albae H-ić (1930)	18,32	44,07

The investigations of apiflora in meadow communities of Serbia have lasted continuously for several years, and included a large number of localities and

over 40 meadow communities. Comparing the results obtained in this work with the results from the investigation of meadow communities of melliferous flora of Goč /Danon, Blaženčić and Zonjić 1990a), Suva Mountain (Danon, Blaženčić and Zonjić 1990b), Tara and Zlatibor (Zonjić, Ivanković and Petković 1991), we have noticed the following characteristics.

Compared to the mountain meadows of Goč (Danon, Blaženčić and Zonjić 1990a), the percentage of melliferous flora in mesophylous meadows in the Velika Morava valley is considerably bigger. At the same time the number of species with a high index of nectar production is also greater in meadow communities that are located near the Velika Morava.

Comparing the presence of honey plants in meadows along the Velika Morava (expressed as a percentage) with their presence in the meadow communities of Suva Mountain (Danon, Blaženčić and Zonjić 1990b), it may be noticed that out of the 15 investigated meadow communities of Suva Mountain, only one was proportionately richer in apiflora than the Velika Morava meadows, while all others (14 communities) had a considerably smaller presence of melliferous species. The coenotic coefficient of nectar production (CCnp) in meadow communities along the Velika Morava had similar values as half (7) of the meadow communities of Suva Mountain, while it was considerably greater than in other communities.

In comparison to the meadow communities and their melliferous flora that were investigated in the region of west Serbia (some localities of Tara and Zlatibor; Zonjić, Ivanković and Petković, 1991), the mesophyl meadows in the Velika Morava valley included twice the number of honey plants (152 species) among which about 90 species had a high index of nectar production (Inp). This points to the great significance of mesophyl meadow vegetation for bee pasture.

CONCLUSION

A total of 152 species was registered in the four analysed meadow phytocenoses at certain localities in the Velika Morava valley. Out of that number, 41 species had an index of nectar production of 4 (Inp 4), and 48 species had Inp 3. This shows that over 50% of melliferous plants belong to the group of very good and excellent ones. There were 37 species with Inp 2, and 26 species with Inp 1.

On the basis of the analysis of the coenotic coefficient of nectar production (CCnp) and the proportional participation of melliferous flora (% mf)in the investigated meadow communities (table 5.), it can be concluded that:

– the biggest coenotic coefficient of nectar production was exhibited by community Brometo-Cynosuretum cristati (35,62) and a somewhat smaller CCnp was shown by the community Festuco-Hordetum secalinii (30,17). The community Poeto-Alopecuretum pratensis followed with a CCnp value of. 25,97, while the lowest CCnp was shown by the community Agrostidetum albae (18,32).

– the proportional participation of melliferous flora in the investigated communities was somewhat greater in the communities Brometo-Cynosuretum cristati (45,33%) and Festuco_Hordetum secalini (45,79%), while in the communities Poeto-Alopecuretum pratensis and Agrostidetum albae it was 43,43 and 44,07% respectively.

The proportional participation of melliferous flora to a certain degree follows the values of the coenotic coefficient of nectar production, and according to that, our investigation on the basis of the values of the CCnp provides us with a realistic picture of the significance of certain plant communities for bee pasture.

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APIFLORA NEKIH MEZOFILNIH LIVADA I PAŠNJAKA U DOLINI VELIKE MORAVE

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SADRŽAJ

U ovome radu prikazana je medonosna flora 4 mezofilne livadske zajednice u dolini Velike Morave. Analizom brojnosti i pokrovnosti medonosnih vrsta u svakoj livadskoj zajednici kao i određivanjem intenziteta nektarske produkcije svake medonosne vrste u zajednici, određen je cenotički koeficijent medonos-

nosti biljne zajednice, koji ilustruje njen značaj za pčelinju pašu. Paralelno je izračunat i procenat medonosnih vrsta u svakoj ispitivanoj zajednici.

Najveću vrednost cenotičkog koeficijenta medonosnosti ima zajednica Brometo-Cynosuretum cristati (35,62), dok je najmanja vrednost cenotičkog koeficijenta zabeležena u zajednici Agrostidetum albae (18,32). Procentualno učešće medonosne flore u ispitivanim zajednicama se kreće u granicama od 45,33% do 44, 07% (tabela 5.)

Procentualno učešće medonosne flore donekle prati vrednost cenotičkog koeficijenta medonosnosti, pri čemu se u ovome našem istraživanju, na osnovu vrednosti CKm dobije realnija slika o značaju neke biljne zajednice za pčelinju pašu.