

POLLEN TRANSPORT OF SPECIES CHEILOSIA BRUNNIPENNIS BECKER, 1894 (DIPTERA: SYRPHIDAE)

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This paper presents an examination of the pollen transport behavior of adults of *Cheilosia brunnipennis* Becker, 1894 on the Suva planina mountain in Serbia (Yugoslavia). The qualitative and quantitative analysis of pollen collected from insects' integument has been done. The results showed that the domination of pollen of *Petasites hybridus*, pollen of *Salix* spp. and trizonocolpate type pollen are the most abundant one among the pollen of 28 plant taxa collected from *C. brunnipennis*.

KEY WORDS: Syrphidae, *Cheilosia brunnipennis*, pollen, transport

INTRODUCTION

Cheilosia brunnipennis Becker, 1894 is distributed in East Mediterranean, Switzerland, Italy, Balkan Peninsula, Israel, and Caucasus. On the Balkan Peninsula, populations of this species were found in Croatia, Montenegro, Serbia, Macedonia and Bulgaria (VUJIĆ, 1996).

The adults of *C. brunnipennis* appear from February to May on the Balkan Peninsula. The earliest record was noted on 21 February on the Rumija mountain (Montenegro) located at 300m. The latest record is from the 5 May in the Jelašnica river, located at 400m on the mountain Suva planina (Serbia).

Preferred environments of this species are Submediterranean deciduous woodlands. Adult habitats are usually located beside rivers and streams. They fly fast among *Salix* trees, settle on catkins and branches (VUJIĆ,

1996). Larva of *C. brunnipennis* is still undescribed.

According to the literature data the adults of *C. brunnipennis* have been collected at the flowers of the following species of plants: *Petasites hybridus* and *Salix* sp. (VUJIĆ, 1996).

In order to improve and augment the data on the biology and pollen-feeding behavior of adults of *C. brunnipennis*, the qualitative and quantitative composition of pollen collected from the integument of adults collected during this study was determined.

MATERIAL AND METHODS

The investigated localities are located on the mountain Suva planina in Serbia. This mountain (1809m) is located in central part of Balkan Peninsula southeast from the town Niš. Suva planina is rich in heterogeneous plants communities that change according to the altitude. Lower zones are characterized by Submediterranean deciduous forests of *Quercus farnetto* and *Q. cerris* covering the slopes and with relict biocenoses of lilac in the gorges. More humid oak and beech woodlands grow at higher altitudes. MATVEJEV & PUNCER (1989) quoted two landscapes types for this mountain: biome of Submediterranean broad-leaved woodlands and biome of South European, mostly deciduous woodlands.

Specimens of analyzed species were collected in the gorge Jelašnica (400m), 02.04.1991., 10 males 11 females; 02.04.1992., 7 males 2 females, leg. Vujić. Insects were captured by an entomological net.

Pollen was collected using vacuum method of RADIŠIĆ *et al.* (1992), and the permanent preparations of pollen were made in glycerin-gelatin.

Pollen and other plant material found at the same localities as insects' were also collected.

Pollen was analyzed from 30 specimens (17 males and 13 females) of species *C. brunnipennis*. Pollinogical material was determined at least to subfamily by using keys and atlases (ERDTMAN, 1952; MOOR & WEBB, 1978) and deductively by means of the collected herbarium material.

The two parameters were calculated concerning the pollen. The complete definition of these parameters is given in the previous paper (RADIŠIĆ *et al.*, 1998):

1. Presence of one type of pollen in relation to the total number of

pollen (parameter 1 on the table I and II).

2. Constancy of presence of one pollen type (parameter 2 on the table I and II).

- euconstant type, which was present on 81-100% of the population sample;
- constant type, which was present on 61-80% of the population sample;
- accessory type which was present on 41-60% of the population sample;
- accidental type which was present on 0-40% of the population sample.

RESULTS, DISCUSSION AND CONCLUSIONS

Examination of the pollen collected from the integument of 30 individuals of *C. brunnipennis* revealed pollen from 28 plant taxa and fungal spores of *Alternaria* type (Table I).

Minimum of 74 and maximum of 2099 pollen grains, and minimum of 6 and maximum of 13 types of pollen grains have been registered on analyzed samples.

The analysis of pollen constancy shows the existence of following pollen types: 5 euconstant, 2 constant, 1 accessory and 20 accidental ones (Table I).

Distinguished types of pollen has been classified into 3 groups according to detected abundance and previous literature data (Table II):

The first group of plant taxa includes species on whose flowers specimens of *C. brunnipennis* have been caught in the former investigations. This group consists of two taxa that are represented with great number of pollen grains on each sample (Table II).

Adults of *C. brunnipennis* keep a considerable amount of pollen grains on their integument while search for food (pollen and nectar) on capitate inflorescence (*Petasites hybridus*) and flower catkins (*Salix*) that have distinct stamens and high productivity of pollen.

Plant taxa that are registered for the first time as visited flowers for the species *C. brunnipennis* form the second and third group. The second group is characterized by a proportional small contribution to the total count of pollen grains (except trizonocolpate type of pollen) and equal constancy of pollen (Table II). The third group characterized by a proportional small contribution to the total count of pollen grains and various constancy of pollen (Table II).

Table I
Qualitative and quantitative composition of pollen collected from the integument of adults of *Cheilosia brunnipennis* Becker, 1894

Locality /Date	No.of specimens Sex	<i>Petasites hybridus</i>	<i>Tussilago farfara</i>	Undetermined 1	<i>Salix</i> spp.	Undetermined 2	Fenestrate	Artemisia type	Trizonocolpate	Undetermined 3	Cupresaceae	Trizonoporate	Trizonocolpate 2	<i>Betula</i> sp.	Undetermined 4	Poliporate
Suva planina Jela (nica 02.04.1991.	1(f)	96	0	3	4	5	12	3	5	1	1	0	0	0	0	0
	2(f)	734	0	3	17	0	1	2	7	4	0	1	0	0	0	0
	3(f)	60	0	0	6	0	2	2	3	0	0	0	1	0	0	0
	4(f)	697	0	0	5	0	4	4	37	1	0	0	1	3	0	0
	5(f)	532	0	0	2	0	1	2	1	1	0	0	0	2	1	0
	6(f)	101	32	0	1	0	1	1	4	0	0	0	0	1	0	0
	7(f)	1559	39	2	2	0	1	5	142	0	1	0	0	1	0	1
	8(f)	179	5	0	17	0	3	4	5	0	0	0	0	0	0	19
	9(f)	109	21	1	20	2	0	1	5	0	1	0	1	5	0	0
	10(f)	323	57	4	10	0	2	3	29	0	2	0	0	3	0	0
	11(f)	795	2	1	17	0	1	2	10	1	0	0	0	3	0	1
	12(m)	119	0	0	8	0	2	3	1047	0	1	0	0	3	0	1
	13(m)	226	0	0	1097	0	2	0	13	0	0	0	0	3	0	0
	14(m)	180	6	2	5	0	0	1	20	0	5	0	0	5	0	0
	15(m)	1447	39	0	44	0	56	2	263	0	0	0	0	3	0	0
	16(m)	297	9	0	6	0	1	1	7	2	1	0	0	3	0	1
	17(m)	332	42	1	6	1	1	1	3	0	5	0	0	2	0	0
	18(m)	314	22	0	6	0	1	1	4	0	0	0	0	0	0	0
	19(m)	225	15	0	47	0	1	3	17	0	0	0	0	1	0	0
	20(m)	920	13	0	7	0	0	3	16	0	8	0	0	2	0	0
Suva planina Jela (nica gorge 02.04.1992.	21(m)	506	0	0	600	0	1	3	33	0	0	0	0	2	1	0
	22(f)	75	1	0	5	0	2	0	50	0	1	0	0	2	0	0
	23(f)	208	2	0	7	1	0	5	57	0	1	0	0	12	0	0
	24(m)	334	0	0	68	0	5	2	334	0	0	0	0	3	0	2
	25(m)	1645	7	0	64	0	1	2	344	0	0	0	0	4	0	0
	26(m)	1968	14	0	75	0	0	0	31	0	2	0	0	0	0	0
	27(m)	902	6	0	46	0	1	0	175	0	0	0	0	2	0	0
	28(m)	159	1	0	12	0	3	2	46	0	0	0	0	23	0	0
	29(m)	447	1	0	18	0	2	3	67	0	1	0	0	2	0	0
	30(m)	851	0	0	12	0	1	10	187	0	17	0	0	0	0	1
Sum of pollen grains of each type of pollen																
	16340	334	17	2234	9	108	71	2962	10	47	1	3	90	2	26	
Parameter 1.	73.09	1.49	0.08	9.99	0.04	0.48	0.32	13.25	0.04	0.21	0.00 4	0.01	0.40	0.00 1	0.1 2	
Sum of specimens with each type of pollen																
	30	20	8	30	4	25	26	30	6	14	1	3	23	2	7	
Parameter 2.	100.00	66.6 7	26.6 7	100.00	13.3 3	83.33	86.6 7	100.00	20.0 0	46.67	3.33	10.0 0	76.6 7	6.6 7	23. 33	

Table I (cont.)

Locality Date	No. of specimens Sex	Chenopodiaceae	Undetermined 5	Saccate	Cyperaceae	Hexazonocolpate	<i>Tilia</i> sp.	Rosaceae	Trizonocolpate	<i>Ornithogalum</i> sp.	Carduus type	Trizonoporate 2	<i>Helianthemum</i> sp.	<i>Asynema</i> sp.	Fungal spore	Alternaria type	Total of pollen grains	Total of type pollens
Suva planina Jela (nica 02.04.1991.	1(f)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	130	9	
	2(f)	0	0	0	0	0	0	0	0	0	0	0	0	0	5	769	8	
	3(f)	0	0	0	0	0	0	0	0	0	0	0	0	0	3	74	6	
	4(f)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	752	8	
	5(f)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	542	8	
	6(f)	0	0	0	0	0	1	0	0	0	0	0	0	0	1	142	8	
	7(f)	0	0	0	0	0	0	2	0	0	0	0	0	0	3	1755	11	
	8(f)	0	0	0	0	0	0	21	0	0	0	0	0	0	4	253	8	
	9(f)	1	1	0	0	0	0	1	0	0	0	0	0	0	2	169	13	
	10(f)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	433	9	
	11(f)	0	0	2	0	0	0	0	0	1	0	0	0	0	2	836	12	
	12(m)	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1184	8	
	13(m)	0	1	0	0	0	0	0	6	0	0	0	0	0	1	1348	7	
	14(m)	0	0	1	0	0	0	1	0	0	0	0	0	0	4	226	11	
	15(m)	0	0	0	0	0	0	1	0	0	0	0	0	2	1	1857	9	
	16(m)	0	4	0	0	0	0	3	0	0	0	0	0	0	1	335	12	
	17(m)	0	0	0	0	1	0	0	0	0	0	0	0	0	1	395	11	
	18(m)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	350	7	
	19(m)	3	0	0	0	0	0	0	0	0	0	0	0	0	3	312	8	
	20(m)	0	1	0	1	0	0	0	0	1	0	0	0	0	4	972	9	
Suva planina Jela (nica gorge 02.04.1992.	21(m)	0	1	0	2	0	0	0	0	0	0	0	0	0	0	1149	9	
	22(f)	0	0	0	0	1	0	0	0	0	0	0	0	0	1	137	8	
	23(f)	0	0	0	0	0	1	0	0	0	0	0	0	0	1	294	8	
	24(m)	1	0	0	0	0	2	0	0	0	0	0	0	0	0	751	9	
	25(m)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2068	8	
	26(m)	0	0	0	1	1	0	0	6	0	0	1	0	0	2	2099	9	
	27(m)	0	1	0	0	0	0	0	14	0	1	0	0	0	3	1148	9	
	28(m)	1	0	0	0	0	0	0	1	2	0	0	1	0	2	251	11	
	29(m)	0	0	0	0	0	0	0	2	2	0	0	0	0	6	545	12	
	30(m)	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1079	7	
Sum of pollen grains of each type of pollen																		
	8	9	3	4	3	2	37	23	6	2	1	1	2		22355			
Parameter 1.	0.04	0.04	0.01	0.02	0.01	0.01	0.17	0.10	0.03	0.00	0.00	0.00	0.00					
										1	4	04	1					
Sum of specimens with each type of pollen																		
	5	6	2	3	3	2	8	4	4	2	1	1	1					
Parameter 2.	16.6	20.0	6.67	10.0	10.0	6.67	26.6	13.3	13.3	6.6	3.33	3.33	3.3					
	7	0		0	0		7	3	3	7	3.33	3	3					

Table II
Distinguished type of pollen (plant taxa)

Type of pollen	Parameter 1 Proportional presence of pollen	Parameter 2 Constancy of pollen
The first group of plant taxa		
<i>Petasites hybridus</i>	73,09%	euconstant type (100%)
<i>Salix</i> spp.	9,99%	euconstant type (89,66%)
The second group of plant taxa		
Trizonocolpate type	13,25%	euconstant type (100%)
Artemisia type	0,32%	euconstant type (86,67%)
Fenestrate	0,48%	euconstant type (83,33%)
The third group of taxa		
<i>Betula</i> sp.	0,40%	constant type (76,67%)
<i>Tussilago farfara</i>	1,49%	constant type (66,67%)
Cupresaceae	0,21%	accessory type (46,67%)

Different habitat patches at the same locality have influence on a spectrum of visited flowers and spatial distribution of syrphids populations. The plants from second and third groups present the possible alternate diet sources for adults of *C. brunnipennis*.

The strongest attractant on mountains Suva planina (Jelašnica) during investigated period are capitate inflorescence of plant species from family Asteraceae (*Petasites hybridus*, *fenestrate* and *Artemisia* type of pollen and *Tussilago farfara*). Blooming of these plants has influence on spatial distribution of investigated species.

Anemophilous or plant species with great contribution of anemophily, trees and shrubs: *Salix* species, *Betula* sp. and plants of family Cupresaceae also determine the spatial distribution of the specimens of *C. brunnipennis*.

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ТРАНСПОРТ ПОЛЕНА ВРСТЕ *CHEILOSIA BRUNNIPENNIS* BECKER, 1894 (DIPTERA: SYRPHIDAE)

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И з в о д

Cheilosia brunnipennis Becker, 1894 је распрострањена у Источном Медитерану, Швајцарској, Италији, Балканском полуострву, Израелу и на Кавказу. На Балканском полуострву је забележана у Хрватској, Црној Гори, Србији, Македонији и Бугарској (Вујић, 1996).

У овом раду је одређен квалитативни и квантитативни састав полена са интегумента 30 јединки врсте *C. brunnipennis* ухваћених у Јелашничкој клисури (Сува планина). Утврђено је 28 биљних таксона од којих су издвојене три групе полена:

Поленова зрна врсте *Petasites hybridus* и врста рода *Salix* учествују са 73,09% и 9,99% у укупној количини полена и регистровани су на свим анализираним примерцима – еуконстантни тип полена (Табела II). Јединке врсте *C. brunnipennis* су и у досадашњим истраживањима ловљене на главичастим цвастима репуха и цветним ресама врбе (Вујић, 1996).

Другу и трећу групу полена чине биљке на чијим цветовима у досадашњим истраживањима примерци врсте *C. brunnipennis* нису констатовани. Другу групу биљака карактерише релативно мало учешће у укупној суми полена (изузев тризоноколпатног типа полена) (Табела II) и заступљеност на више од 81% примерака. Трећу групу карактерише мало учешће у укупној количини полена и варијабилан степен присутности (Табела II).

На подручју Јелашничке клисуре у току испитиваног периода просторни распоред адултних јединки врсте *C. brunnipennis* одређују биљне врсте из фамилије Asteraceae: *P. hybridus*, фенестратни и артемизија тип полена и *Tussilago farfara*; анемофилне и биљне врсте са значајним уделом анемофилије, дрвеће и жбунови: *Salix* spp. *Betula* sp. и биљке из фамилије Cupresaceae такође одређују просторни распоред јединки *C. brunnipennis*.

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