Constance coefficient of blowflies (Diptera: Calliphoridae) in Nova Iguaçu, Rio de Janeiro, Brazil

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Abstracts: It was carried out a study to investigate the presence of Calliphoridean flies (Diptera: Calliphoridae) in a reforestation area in Nova Iguaçu, Rio de Janeiro, Brazil. The research was carried out from April/2000 to March/2001 and the collects were made with traps built according to Ferreira (1978) installed in an area near of a pond and baited with mice carcasses, bovine liver and banana. During the collects, 12145 blowflies were captured and the evaluations showed the presence of *Chrysomya megacephala, Chrysomya albiceps, Chrysomya putoria, Cochliomyia macellaria, Hemilucilia segmentaria, Hemilucilia semidiaphana* inside of the Chrysomyinae subfamily; and *Phaenicia eximia* and *Phaenicia. cuprina* in the Calliphorinae subfamily, establishing some difference when related the species, baits and the seasons. The results demonstrated also that *C. megacephala, C. albiceps, C. putoria and P. cuprina* could be considered constant inside the area and *C. macellaria, H. semidiaphana* and *H. segmentaria* as accessory species.
Key words: Calliphoridae, Flies, Blowflies, Diptera

Resumo: Foi realizada uma pesquisa para investigar a presença de dípteros califorídeos em uma área de reflorestamento em Nova Iguaçu, Rio de Janeiro, Brasil. A pesquisa foi realizada de abril de 2000 a março de 2001 e as coletas foram feitas com armadilhas construídas de acordo as indicações de Ferreira (1978). As armadilhas foram instaladas em área próxima de uma lagoa e iscadas com carcaças de camundongos, fígado bovino e banana. Durante as coletas, 12145 califorídeos foram capturadas e as avaliações demonstraram a presença de *Chrysomya megacephala, Chrysomya albiceps, Chrysomya putoria, Cochliomyia macellaria, Hemilucilia segmentaria, Hemilucilia. semidiaphana* dentro da subfamília Chrysomyinae e *Phaenicia eximia* e *Phaenicia. cuprina* na subfamília Calliphorinae estabelecendo algumas diferenças quando relacionadas às espécies, iscas e as estações do ano. Os resultados demonstraram também que *C. megacephala, C. albiceps, C. putoria* e *P. cuprina* podem ser consideradas como espécies constantes dentro da área avaliada e *C. macellaria, H. semidiaphana* e *H. segmentaria* como espécies acessórias.
Palavras chaves: Calliphoridae, Moscas, Varejeiras, Diptera.

Introduction

The blowflies (Diptera: Calliphoridae) measure from 4 to 6mm of length, it has a round and oval abdomen and darkened body with metallic reflex from greenish to cupric. The larvae have a sharp anterior edge with strong oral hooks; and its posterior edge is truncate with the presence of breathing holes. According to Stedman (1996) the close relation between the man and these flies shows problems related to the public health, reason by which its occurrence has been studied in several countries in the world, demonstrating its presence so much in rural areas as in urban areas (Madeira *et al.,* 1989). The major problem is related with the microorganism disseminations since its spreading is high increasing the risk (Valgode *et al.*, 1998; Greenberg, 1973; Furlanetto *et al.*, 1984 and Norberg *et al.*, 1999). But, according to Veronesi & Focaccia (1996), the larvae can also cause dermatitis on the surface or in the cavities of the body due to the possibilities of the use of several substrates as food, including healthy animals. Thus, we have *Cochliomyia hominivorax* (Coquerel, 1858) attracted by wounds and superficial epithelial, where the adults puts its eggs (Rey, 1991) and *Chrysomya* and *Phaenicia* genus attracted by fish, liver, lungs and meat of bovine, chicken viscera, fresh shrimp, fruits, human and chicken feces, decomposed vegetables and animals carcasses, including those of humans (Zumpt & Patterson, 1952; Linhares, 1981; Cook, 1991; Linhares & Avancini, 1989; Mendes & Linhares, 1993; Paraluppi & Linhares, 1995; d'Almeida & Almeida, 1998 and Rodrigues-Guimarães *et al.*, 2000 and 2001). Observing the importance and its presence in a reforestation area near to the University, it was decided by the verification of the seasonality of the several species in the area.

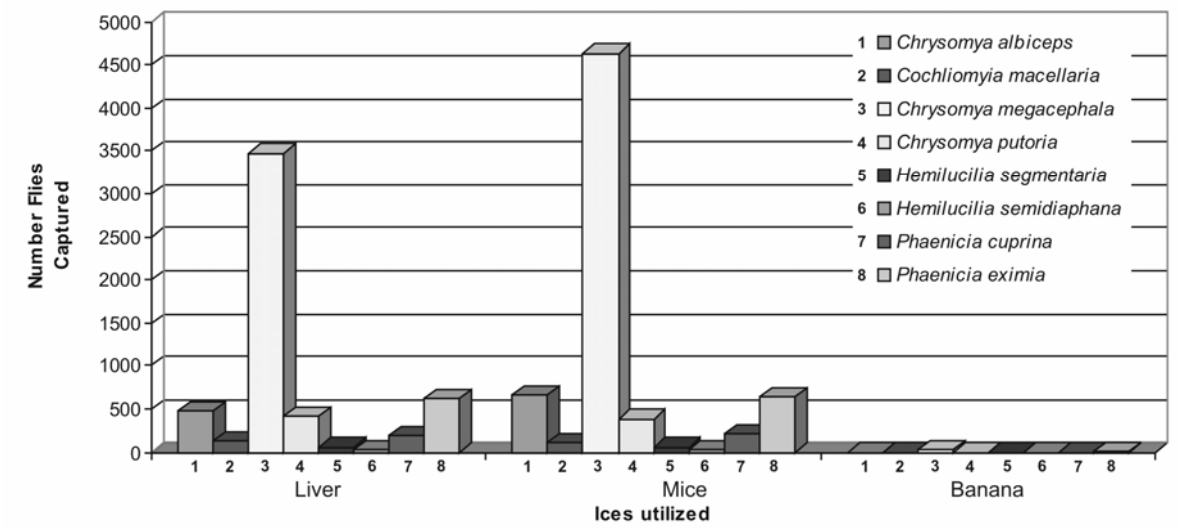

Fig. 1. Total number of each species, blowflies (Diptera: Calliphoridae), captured in the area of reforestation of University Iguaçu - UNIG, in the period of april 2000 the march of 2001, in relation the ices used in the traps.

Material and Methods

The survey was carried out from April/2000 to March/2001 in a reforestation area located near to the University, in Nova Iguaçu, Rio de Janeiro, Brazil. The traps were made according to Ferreira (1978) and were placed in six places with a height of 1.5mts; three were installed in an area near to the pond, and three distant 50mts. The traps were baited weekly with mice carcasses, bovine liver and banana.

The specimens collected were put in recipient with alcohol at 70% for posterior quantification and identification. Records of temperature, amount of rain, and relative humidity were made. Data was compared through the Variance analysis (ANOVA; $p<0.05$), and the correlation coefficient between abiotic factors, season, baits and trap localization was also established. The occurrence level of each species (Constance coefficient) was also established through the following formula: C= p.100/n (where p= specimens by species and n= total of collects).

Results

During the survey 52 collects, capturing 12145 blowflies, were carried out. The specimens were distributed: *Chrysomya megacephala* (Fabricius, 1794), *C. albiceps* (Wiedemann, 1819), *C. putoria* (Wiedemann, 1818), *Cochliomyia macellaria* (Fabricius, 1775), *Hemilucilia segmentaria* (Fabricius, 1805) and *H. semidiaphana* (Engel, 1931) of the Chrysomyinae subfamily and *Phaenicia eximia* (Wiedemann, 1819) and *P. cuprina* (Wiedemann, 1830) of the Calliphorinae subfamily (table 1). The statistical analysis between the total of specimens and the season demonstrated no significant difference. But when it was analyzed in relation to species, *Phaenicia eximia, P. cuprina, Chrysomya megacephala, C. putoria* and *C. albiceps* showed differences. The preference by baits was also evident. Thus, *H. semidiaphana* was not attracted by banana unlike than *P. eximia, C. albiceps, H. semidiaphana* males and *P. eximia* females. This result showed also difference between the seasons, establishing it between males of *H. segmentaria* – on autumn/spring-, *C. albiceps* and *C. megacephala* – on autumn/ summer and winter/ summer, *P. cuprina* – on autumn/summer and spring/summer-, *C. putoria* and *P. eximia* – on autumn/summer, winter/summer and spring/summer. Among females, the difference was established between *C. putoria* and *P. cuprina* – on autumn/winter, winter/summer and spring/summer and *C. megacephala* – on autumn/ summer and winter/summer.

According to Bodenheimer (Silveira-Neto *et al.*, 1976), the Constance coefficient establishes the presence of the species as constant (when it found at least in 50% of the total of collects), accessories (when it found in 20% to 50% of the total of collects) or accidental (when it found in up to 25% of the collects). Using this classification as a basis, we registered *C. megacephala, C. albiceps, C. putoria* and *P. cuprina* as a constant species while *C. macellaria, H. semidiaphana* and *H. segmentaria* were considered as accessory species (Figure 1).

Discussion

Despite *C. megacephala* has been recently introduced in Brazil, it was the species found with higher frequency. According to Guimarães *et al.* (1978) this result can be supported by its capacity to colonize several habitats (Pianka, 1970). Oliveira *et al.* (1999) and Rodrigues-Guimarães *et al.*, (2000 and 2001) showed the predominance of the species in an urban area of the metropolitan region in Rio de Janeiro city. According to d'Almeida & Lopes (1983), Carraro & Milward-de-Azevedo (1999), d'Almeida *et al.* (1991), Oliveira *et al.* (1999), Rodrigues-Guimarães *et al.* (2000 and 2001) and Valgode *et al*. (1998), *C. megacephala* seems to substitute the native species in several places, but in other brazilian regions it has a contrast because it was not found or it was found with little frequency (Ferreira 1983 and Ferreira & Barbola, 1998). According to authors, this difference could be related with the disposable food or with the colonization phase.

Table I. Calliphoridean species captured in a reforestation area near to the Universidad Iguaçu, Nova Iguaçu, Rio de Janeiro, Brazil, in the period from April/2000 to March/2001. ST = Sub Total

		Autumn			Winter			Spring			Summer			Total
Species	**traps**	♂	♀	%	♂	♀	%	♂	♀	%	♂	♀	%	
Chrysomya	liver	4	6	15.87	20	42	25.83	55	90	51.24	118	135	46.68	470
Ibiceps	mice	6	47	84.13	29	149	74.17	52	86	48.76	123	166	53.32	658
	banana	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	
	ST	10	53	100.00	49	191	100.00	107	176	100.00	241	301	100.00	1128
Cochliomyia	liver	2	2	40.00	13	16	42.03	44	21	61.90	20	12	57.14	130
macellaria	mice	3	3	60.00	18	22	57.97	26	14	38.10	19	5	42.86	110
	banana	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	
	ST	5	5	100.00	31	38	100.00	70	35	100.00	39	17	100.00	240
Chrysomya	liver	88	57	24.58	52	35	18.16	566	778	45.50	781	1120	46.20	3477
megacephala	mice	163	280	75.08	145	246	81.63	660	941	54.20	917	1282	53.44	4634
	banana	1	1	0.34	0	1	0.21	5	4	0.30	11	4	0.36	27
	ST	252	338	100.00	197	282	100.00	1231	1723	100.00	1709	2406	100.00	8138
Chrysomya	liver	9	5	41.18	9	13	33.85	52	46	49.75	126	162	56.47	422
putoria	mice	13	7	58.82	16	27	66.15	58	41	50.25	103	119	43.53	384
	banana	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	
	ST	22	12	100.00	25	40	100.00	110	87	100.00	229	281	100.00	806
Hemilucilia	liver	2	6	50.00	2	1	23.08	22	15	53.62	4	6	55.56	58
segmentaria	mice	5	3	50.00	8	2	76.92	20	12	46.38	5	3	44.44	58
	banana	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	
	ST	7	9	100.00	10	3	100.00	42	27	100.00	9	9	100.00	116
Hemilucilia	liver	2	1	37.50	3	2	33.33	7	3	43.48	1	8	64.29	27
semidiaphana	mice	2	3	62.50	4	6	66.67	5	8	56.52	3	2	35.71	33
	banana	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	
	ST	4	4	100.00	7	8	100.00	12	11	100.00	4	10	100.00	60
Phaenicia	liver	7	6	40.63	14	14	52.83	11	23	54.84	44	73	46.80	192
cuprina	mice	5	14	59.38	12	13	47.17	10	18	45.16	49	84	53.20	205
	banana	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	
	ST	12	20	100.00	26	27	100.00	21	41	100.00	93	157	100.00	397
Phaenicia	liver	12	50	45.26	25	64	36.48	38	130	55.08	150	157	53.48	626
eximia	mice	18	57	54.74	29	125	63.11	39	98	44.92	118	147	46.17	631
	banana	0	0	0.00	1	0	0.41	0	0	0.00	0	2	0.35	3
	ST	30	107	100.00	55	189	100.00	77	228	100.00	268	306	100.00	1260
Total		**342**	**548**	**890**	**400**	**778**	**1178**	**1670**	**2328**	**3998**	**2592**	**3487**	**6079**	**12145**

P. eximia, the 2nd species in frequency, has the same behavior. This behavior is supported by the use of several types of substrates to complete its life cycle. d'Almeida (1989) and d'Almeida *et al.* (1991) and Rodrigues-Guimarães *et al.* (2001) were the authors whom registered difference in the frequency. They carried out its works in several places and with varied baits, but the results could be supported by the same factors mentioned above. The same frequency was registered for *P. eximia* in Belo Horizonte, Minas Gerais by Madeira *et al.* (1982). According to Ferreira & Barbola (1998), *P. eximia* was more frequent in the urban area of Curitiba, Paraná; and Baumgartner & Greenberg (1985) found the same result suggesting an occurrence related with the used baits.

C. albiceps with 9.28% of occurrence was the 3rd species most frequent. According to Guimarães *et al.* (1978), this species was also recently introduced in Brazil spreading with success. The larva of this species has a predatory process directed to several larval species; probably its spreading is related with this behavior and with its short life cycle; the registered high variation among this species could also be related with this behavior (d'Almeida & Lopes, 1983; Baumgartner & Greenberg, 1985). These authors described this species with little synanthropy and high capacity of spreading. According to Oliveira *et al.* (1999), in the Zoo it was registered as the 2nd in frequency. The increase of its population and its high dispersion rate determined its possible adaptation capacity, probably facilitating the suppression of some native species of the American continent.

C. putoria has frequently been registered in the urban areas (Oliveira *et al.*, 1999; Guimarães *et al.*, 1978; d'Almeida & Lopes, 1983 and Paraluppi & Castellón, 1994). Here it was the 4th species in frequency; and *P. cuprina* is regarded as a synanthropic fly by several authors, although here it was the 5th in frequency (3.29%). But the contrasts are frequent, thus it has that in Minas Gerais it had a lower frequency than *C. putoria, P. eximia* and *C. macellaria* (Madeira *et al.*, 1982); and in Rio de Janeiro, according to d'Almeida *et al.* (1991) it was frequently found. According to d'Almeida & Lima (1994) and Bruno *et al.*, (1993) the observed difference could be influenced by the abiotic factors, variations of the soil, baits and used traps. The decrease of *C. macellaria* population was corroborated in this paper. This species was the 6th (1.97%) in frequency. According to Baumgartner & Greenberg (1985), Ferreira (1983) and Ferreira (1978), the dissemination and colonization of several areas by *Chrysomya* spp is related with the decrease of *C. macellaria* it also being related by Prado & Guimarães (1982); d'Almeida & Lopes (1983) and Rodrigues-Guimarães *et al*, (2001) with the increase of *C. megacephala, C. albiceps* and *C. putoria.* And finally, *H. segmentaria* and *H. semidiaphana* was less collected corroborating the reports of Oliveira *et al.* (1999) and Vianna *et al.* (1998).

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