SCIENTIFIC COMMUNICATION

INSECTS (ARTHROPODA: INSECTA) COLLECTED ON BOVINE FECES AFTER DIFFERENT TIMES OF FIELD EXPOSURE IN ITUMBIARA, GOIAS, BRAZIL

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ABSTRACT

The collection of insects in cattle dung deposited in pasture were observed from January to October 2001 in Itumbiara, Goias, Brasil. Cattle dung pats were exposed at a pasture for 24, 48, 72, 96, 120, 144, 168, 192, 216 and 240 hours and were than taken to the laboratory separate from each other, for Diptera extraction. A total of 100 dung pats were exposed at pasture. A total of 3,229 Scarabaeidae (Coleoptera) and 3,099 Diptera were collected. The most abundant species dipterous were: *Palaeosepsis* spp. and *Sarcophagula occidua* and coleopterous: *Ataenius aequalis* e *Aphodius lividus*. The periods of the highest population peak were: 24, 48 and 72 hours.

KEY WORDS: Insecta, Diptera, Scarabaeidae, cattle dung.

RESUMO

INSETOS (ARTHROPODA: INSECTA) COLETADOS EM FEZES BOVINAS EM DIFERENTES TEMPOS DE EXPOSIÇÃO NO CAMPO EM ITUMBIARA, GOIAS, BRASIL. A coleta de insetos em fezes bovinas depositadas nas pastagens foram observadas no período de janeiro a outubro de 2001 em Itumbiara, Goiás, Brasil. As fezes bovinas foram expostas nas pastagens por períodos de 24, 48, 72, 96, 120, 144, 168, 192, 216 e 240 horas de exposição e posteriormente levadas para o laboratório para a separação dos insetos, num total de 100 fezes bovinas, sendo 10 para cada período de exposição. Foram coletados 3.229 Scarabaeidae (Coleoptera) e 3.099 Diptera. As espécies mais abundantes entre os dípteros foram: *Palaeosepsis* spp. e *Sarcophagula occidua* e coleópteros: *Ataenius aequalis* e *Aphodius lividus.* Os períodos de maiores picos populacionais foram: 24, 48 e 72 horas.

PALAVRAS-CHAVE: Insecta, Diptera, Scarabaeidae, fezes bovinas.

Among the insects, the muscoids dipterous group from the families Calliphoridae, Sarcophagidae and Muscidae stand out, stand out having great medical and veterinarian importance since they may be mechanical and biological vectors of microorganisms pathogenic to man and domestic animals. Besides, they are considered a problem for public health in many areas of the worldsince they may invade residences and working places becoming an annoyance for the population (GUIMARÃES et al., 1983).

The main pest-species that develop on this type of substrate are *Musca domestica* (L) and *Stomoxys calcitrans* (L) (Diptera: Muscidae), which develop mostly on feces of confined cattle, as well as *Musca autumnalis*(De Geer) and *Haematobiairritans* (L) (Diptera: Muscidae). On this substrate, coprophagous coleopterans from the family Scarabaeidae are also found. These coleopterans disrupt the feces, aerating and mixing them with the soil, thus turning them unsuitable for colonization by several other insect populations (WINGO et al., 1974).

The Scarabaeidae (Coleoptera) are generally coprophagous and inhabitants of excrements where many larvae and adults feed. They are considered very important for the control of synanthropic flies that reproduce on bovine manure FLETCHMANN & RODRIGUES, 1995; MARTINS & CONTEL, 1997a; MARTINS & CONTEL, 1997b; KOLLER et al., 1999; AIDAR et al., 2000; MARCHIORI et al., 2002) as well as in controlling bovine gastrointestinal parasite nematodes; besides improving soil structure and fertility (MIRANDA et al., 2000; FLETCHMANN et al., 1995a). They present a typical behavior of burying small portions of fecal mass in the soil and build galleries causing soil aeration and drying and, concomitantly, burying larvae and eggs that by chance are present in the manure attacked by them (FLETCHMANN et al., 1955a).

Table 1 - Number of Diptera and Coleoptera from different taxonomic groups extracted from 100 artificially prepared cattle dung pads exposed for distinct periods of time under field conditions at the soils level in a pasture in Itumbiara County, State of Goias, Central Brazil (18°25'S and 49°13'W), evaluated from January to October 2001.

Taxonomic groups	hours											
	24	48	72	96	120	144	168	192	216	240	total	%
DIPTERA												
Muscidae:												
Brontaea quadristigma	-	6	-	-	-	2	11	12	16	9	56	1.8
Brontaea debilis	70	11	7	08	8	19	9	3	10	6	151	4.9
Cyrtoneurina pararescita	-	-	-	-	2	-	8	26	17	18	71	2.3
Sarcophagidae:												
Ravinia belforti	-	-	-	-	4	-	2	-	-	1	7	0.2
Sarcophagula occidua	108	231	224	107	201	56	54	142	13	77	1213	39.1
Sepsidae:												
Archisepsis scabra	1	1	-	-	2	-	1	4	19	1	29	0.9
Palaeosepsis spp.	169	44	160	137	114	347	98	181	164	144	1558	50.3
Sphaeroceridae:												
Sphaeroceridae	10	-	-	-	-	-	-	4	-	-	14	0.5
Total	358	293	391	252	331	424	183	372	239	256	3099	100.0
COLEOPTERA												
Scarabaeidae												
Agamopus viridis	6	4	0	-	-	-	-	-	-	1	13	0.4
Aphodius sp.1	58	12	-	-	-	-	2	-	-	2	74	2.3
Aphodius sp.2	57	16	-	-	-	-	3	-	-	1	77	2.4
Aphodius nigrita	11	13	15	18	1	1	-	2	-	2	63	2.0
Aphodius lividus	115	93	26	7	48	5	3	21	25	1	344	10.6
Ataenius sp.1	-	-	-	1	5	1	18	2	-	-	27	0.8
Ataenius aequalis	121	266	182	224	192	232	216	287	259	227	2206	68.3
Canthon lituratus	10	6	-	-	-	-	-	-	-	-	16	0.5
Dichotomius bos	10	3	7	1	1	2	2	1	-	3	30	0.9
Digitonthophagus gazella	123	64	61	31	10	4	-	3	-	1	297	9.2
<i>Euparia</i> sp.	-	-	-	-	2	-	-	-	-	-	2	0.1
Onthophagus hirculus	11	10	3	-	2	2	1	4	-	6	39	1.2
Onthophagus ranunculus	4	-	-	-	-	-	-	-	-	-	4	0.2
Trichillum externepunctatum	26	7	4	-	-	-	-	-	-	-	37	1.1
Total	552	494	300	282	261	247	245	320	284	244	3229	100.0
TOTAL	973	824	736	638	651	710	437	737	528	524	6758	100.0

The objective of the present research work was to identify the insects (Diptera and Scarabaeidae) collected on bovine feces after different times of field exposure in Itumbiara County, State of Goias, Central Brazil.

The experiment was conducted at Chácara Vilela (Vilela Farm), located in the district of Village, five km away from Itumbiara (18°25'S; 49°13'W), at the Paranaíba river shore. The farm has approximately 29 hectares and 50 dairy "girolanda" bovine cattle heads. Fresh feces were collected immediately after being excreted in the corrals and mixed in two 20-liters plastic buckets. Feces pads, of approximately two liter each, were then made and placed into 10 plastic trays (40 cm in diameter and 12 cm in height) containing a 5-cm layer of soil from the same site. The trays were bottom-perforated to allow for rainwater drainage. These so prepared trays were then placed at the soil line in the field at 9:00 o'clock AM for arthropod visitation. At each one-day interval, one pad was collected after 24, 48, 72, 96, 120, 144, 168, 192, 216, and 240 hours of field exposure and taken to the laboratory. These trays were covered with cheesecloth and maintained in the laboratory for pupae collection using the flotation method. Pupae were individualized into 00 gelatin capsules and maintained in the laboratory until emergence of flies.

A Berlese funnel, containing flasks filled with 70% ethanol for approximately five days, were used for Scarabaeidae collection. Collections were carried out on January 15th, February 10th, March 11th, April 10th, May 15th, June 10th, July 15th, August 15th, September 10th, and October 15th 2001. Thus, 10 collections of 10 fecal pads for each time of exposure were performed totaling 100 bovine fecal pads collected. Scarabaeidae adults obtained by this procedure were counted and sent for identification. Dr. Fernando-Vaz-de-Mello, from the Federal University of Lavras, State of Minas Gerais, identified the Scarabaeidae. The preference of species by age of pads was tested by Chi-square, at 5.0% probability.

Palaeosepsis spp. (Diptera: Sepsidae) was the most abundant species, totaling 50.2% of the insects collected, followed by *Sarcophagula occidua* (Fabricius) (Diptera: Sarcophagidae) (Table 1). Although the horn fly was present in the studied area, pupae of this species were not found in the samples probably due to the use of chemicals for the control of ectoparasites.

The species *Brontaea debilis* (Williston) (Diptera: Muscidae), *S. occidua* and *Palaeosepsis* spp. were found on feces samples of all times of exposure. SANDERS & DOBSON (1966) stated that the Sepsidae are the first flies to visit feces, although they are probably not solely limited to fresh feces. According to LAURENCE (1955), some groups of Diptera, such as Sphaeroceridae and Sepsidae, seem to be non-demanding in relation to time of exposure of the rearing substrate, since they may present more than one generation in the same fecal mass. The Diptera were more abundantly collected on feces of 72 and 144 hours of field exposure (16.6% and 13.6%, respectively). It was also found that the higher action of dipterans (52.4%) occurred on the fresher fecal pads with higher moisture content.

Concerning preference of species of flies for time of exposure of feces, the following results were obtained: *Brontaeaquadristigma* Thonson (Diptera: Muscidae) preferred feces of 48, 168, 192, 216, and 240 hours; *B. debilis* preferred feces of 24 and 168 hours; *Cyrtoneurina pararescita* Couri (Diptera: Muscidae) preferred feces of 168, 192, and 240 hours; *Raviniabelforti* (Prado & Fonseca) (Diptera: Sarcophagidae) preferred feces of 120 and 168 hours; *S. occidua* preferred feces of 48, 72, 120, and 216 hours; *Archisepsisscabra* (Loew) (Diptera: Sepsidae) preferred feces of 96, 144, 144, 168, 216, and 240 hours; and Sphaeroceridae preferred feces of 24 and 192 hours of field exposure (P < 0.05).

Ataenius aequalis Harold was the most abundant species (67.3%) followed by the species *Aphodius lividus* Balth (10.7%) among the Scarabaeidae collected (Table 1). It is believed that these species are the most well adapted to pasture areas in the Itumbiara area. These two species were also collected in an experiment carried out by MARCHIORI et al. (2002) at the same location, on feces exposed in the pastures for 196 hours. It is shown on Table 1 that the majority of Scarabaeidae species (85.7%) and individuals (17.0%) presented peaks of occurrence on feces of 24 hours of exposure, except for *Aphodius nigrita* Fabricius and *A. aequalis*, wich presented peaks on feces of 96 and 196 hours of exposure, respectively. This finding is important since adults of horn flies oviposit preferentially on fresh-excreted fecal masses (GUIMARĂES, 1990).

It was observed that the higher activity of the Scarabaeidae species occurred on the fresher bovine fecal pads (Table 1) with time of exposures of 24 and 48 hours. DOUBE (1990), FLETCHMANN & RODRIGUES (1995), and FLETCHMANN et al. (1995a) had also achieved similar results. In the ecological succession of insects that occur on bovine feces, only the coprophagous species found on fresher feces (24 and 48 hours) would be the most suitable for selection in designing a future program of control of flies (FLETCHMANN et al., 1995a).

The following results were found in relation to preference of species for time of feces exposure in the field: *Agamopus viridis* (Boucomont), *Aphodius* sp.1, *Aphodius* sp.2, *Canthon lituratus* (Germar) and *Onthophagus hirculus* Mannerheim preferred feces of 24 and 48 hours; *A. nigrita* preferred feces of 24, 48, 72, and 96 hours; *A. lividus* preferred feces of 24, 48, 120, and 144 hours; *Ataeniussp.* 1 preferred feces of 120 and 168 hours; *A. aequalis* preferred feces of 120, 144, 168, 292, 216 and 240 hours; *Dichotomius bos*Mannerheim preferred feces of 24 and 72 hours; *Digitonthophagus gazella* Fabricius preferred feces of 24, 48,72, and 96 hours; and *Trichillumexternepunctatum* Borre preferred feces of 24, 48, and 72 hours of field exposure ($\lambda^2 = 1421,26$; DF = 99; P < 0.0001).

There is a large diversity and abundance of Diptera and Coleoptera (Scarabaeidae) species that develop on bovine feces in the pastures of the region studied. These species presented population peaks on feces exposed in the field for 24, 48 and 72 hours.

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