

# Calliphorid and Sarcophagid Fly Fauna of District Faisalabad

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**Abstract.-** Present study was conducted to determine the trap efficacy and fauna of calliphorid and sarcophagid flies of Faisalabad district during winter obtained from two sources *i.e.* traps and pupae. Five blowfly traps were used for this purpose. Eleven calliphorid species namely *Challiphora vicina*, *C. vomitoria*, *Lucilia fumicosta*, *L. cuprina*, *L. sericata*, *L. sinensis*, *L. andrewsi*, *L. ampullacea*, *L. illustris*, *L. porphyrina*, and *L. papuensis* were recovered from traps and six calliphorid species namely *Challiphora vicina*, *L. fumicosta*, *L. cuprina*, *L. ampullacea*, *L. illustris* and *L. papuensis* were recovered from pupae. The results showed that *L. fumicosta* (550), *L. ampullacea* (50) and *L. cuprina* (39) dominated the trap data while *C. vicina* (2873) dominated the pupal data. *C. vomitoria* (1), *L. sericata* (2), *L. sinensis* (6), *L. andrewsi* (1) and *L. porphyrina* (1) were exclusive to trap data. Five sarcophagid species namely *Sarcophaga calicifera* (162); *S. haematodes* (332), *S. walayari* (84), *S. orientalis* (21) and *S. ballardi* (306) dominated the pupal data while four sarcophagid species namely *Sarcophaga peshelicii* (1), *S. basalis* (3), *S. graveleyi* (5) and *S. futilis* (1) dominated the trap data. *S. basiseta* (1), *S. orientalis* (21), *S. ballardi* (306) were exclusive to pupal data while *S. peshelicii* (1), *S. basalis* (3), *S. graveleyi* (3) and *S. futilis* (1) were exclusive to trap collection. Greater number of flies were recovered from pupae compared to that from traps and greater number of species were observed from trap data compared to pupal data. Blowfly traps proved to be 85% efficient.

**Key words:** Calliphorids, sarcophagids, blowfly traps, trap efficacy, blowflies, flesh flies.

## INTRODUCTION

**B**low flies (Diptera: Calliphoridae) are of greatest importance to the forensic entomological investigation in estimating the time of death of human cadaver (Smith, 1986). These flies are also very important in other types, of forensic investigations (Greenberg, 1985, 1991; Introna *et al.*, 1998; Amendt *et al.*, 2000; Wolff *et al.*, 2001). A great number of species develop in decomposing organic matter including carrion, while some are obligate parasites of vertebrates and may develop in other invertebrates, especially arthropods. Flesh flies (Diptera: Sarcophagidae) are of cosmopolitan distribution. The adults are generally large, silvery gray with a tristripped thorax and checkered abdomen. These are usually strongly bristled and with reddish eyes. The genus *Sarcophaga* is usually associated with carrion and is known to cause wound and intestinal myiasis in man and domestic animals. (Zumt, 1965; Hall and Wall, 1994; Farakas *et al.*, 1997). The females are viviparous and deposit active first instar larvae. The behaviour

of flesh flies as parasitoids have also been studied by Allen and Pape (1996) and Mckillup *et al.* (2000). Flesh flies as a predator have been studied by Pape and Arribas (1999), Schwendinger and Pape (2000), and Pape *et al.* (2000). Different traps are used for the management of blowflies and flesh flies. Keeping in view the immense importance of these flies, present studies were conducted to record calliphorid and sarcophagid flies present in Faisalabad District using traps and pupae as indicators.

## MATERIALS AND METHODS

The present study was undertaken to ascertain the species composition of blowflies and flesh flies in Faisalabad District during winter, 2003-2004 and the efficacy of traps used for the management of these flies. For this purpose, five blowfly traps (Shah and Sakhawat, 2003) were set on the open area of the Entomological Fields of the Department of Zoology, GC University, Faisalabad. This place was 3.66 meters high and the inter trap distance was 2.52m. Randomized complete block experimental design with five replicates including one control was used in this study. Five rabbits were killed

simultaneously with chloroform, placed inside the inverted bucket on a tray. One rabbit per trap was used as bait in these experiments. The trapped flies were collected daily from sealed plastic collecting bags fastened at the top of the inverted funnel of the trap until the flies cease to visit the traps in about five days. The collected flies were killed by dropping them in transparent plastic vials containing 75% alcohol and preserved as such. The vials were properly labeled and stored in laboratory for species analysis. The whole process was repeated each month during winter (December, January, February). The restless prepupae were also collected and stored in jam bottles covered with tissue paper. The trapped flies and flies obtained from pupae were identified to family level using keys provided by Smith (1986) and to species level using keys provided by Senior-White *et al.* (1940).

## RESULTS

Table I shows that only one calliphorid species namely *Calliphora vicina* was recovered from pupae in comparison to nine calliphorid species represented by trap data during December. The species captured during December were *Calliphora vicina*, *Lucilia fumicosta*, *L. cuprina*, *L. sericata*, *L. sinensis*, *L. andrewsi*, *L. ampullacea*, *L. illustris*, and *L. papuensis*. During January again the same single species *i.e.* *C. vicina* was represented by pupal data in comparison to seven trapped species. The trapped species during January were *C. vicina*, *L. fumicosta*, *L. cuprina*, *L. sinensis*, *L. ampullacea*, *L. illustris*, and *L. papuensis*. During February however, six species of family Calliphoridae were recovered from pupae in comparison to eight species caught by traps. The eclosed species were *C. vicina*, *L. fumicosta*, *L. cuprina*, *L. ampullacea*, *L. illustris*, and *L. papuensis*. Overall eleven species *i.e.*, *C. vicina*, *C. vomitoria*, *L. fumicosta*, *L. cuprina*, *L. sericata*, *L. sinensis*, *L. andrewsi*, *L. ampullacea*, *L. illustris*, *L. porphyrina*, and *L. papuensis* were recovered from traps and six species namely *C. vicina*, *L. fumicosta*, *L. cuprina*, *L. ampullacea*, *L. illustris*, and *L. papuensis* were obtained from pupae. *L. fumicosta*, *L. ampullacea* and *L. cuprina* dominated the trap data, while *C. vicina* dominated the pupal data. Quantitative dominance was shown

by pupal data, whereas qualitative dominance was shown by trap data being more diverse. *C. vomitoria*, *L. sericata*, *L. sinensis*, *L. andrewsi* and *L. porphyrina* were exclusive to trap data.

Table II shows the comparison of the sarcophagid flies obtained from pupae and caught by the traps during winter, 2003-2004. *Sarcophaga calicifera*, *S. haematodes*, *S. walayari*, *S. orientaloid* and *S. ballardi* dominated the pupal data while *Sarcophaga peshelicis*, *S. basalis*, *S. gravely*, and *S. futilis* were dominated in the trap data only. Pupal data proved its numerical superiority over the trap data. *S. basiseta*, *S. orientaloid* and *S. ballardi* were exclusive to pupal data while *S. peshelicis*, *S. basalis*, *S. gravely* and *S. futilis* were specific to trap data. Trap data proved to be more diverse than the pupal data.

Table III shows overall numerical comparison of the pupal data with trap data with reference to Calliphoridae and Sarcophagidae during winter 2003 – 2004. The pupal data dominated numerically over the trap data throughout the winter season with only single exception of Sarcophagidae during February when it showed opposite trend.

## DISCUSSION

During present study an attempt has been made to make a quantitative and qualitative comparison between the carrion flies recovered from traps and from immature stages during winter, 2003–2004. The numerical abundance of carrion flies recovered from pupae usually superseded the one secured from traps of all months except during February in case of flesh flies being contrary. This quantitative analysis does not carry much weight because a single fly can lay hundreds of eggs and therefore, making the comparison useless. The single exception observed during February might be due to other physical, biological and environmental factors, which might have destroyed the pupae making the emerging flies less abundant. The examples of physical and biological factors might be rain, wind, severe cold, diapause predation by crows, ants and parasitoids. However, the qualitative comparison is very important because it gives information about the flies which visited the traps but were not captured (flies obtained exclusively

**Table I.- Comparison of calliphorid fauna recovered from traps and from pupae during winter season, 2003-2004.**

Species	December		January		February		Total	
	Pupal data	Trap data	Pupal data	Trap data	Pupal data	Trap data	Pupal data	Trap data
<i>Challiphora vicina</i>	1188	10	1033	17	652	19	2873	46
<i>Challiphora</i>	0	0	0	0	0	1	0	1
<i>Vomitoria</i>	14	0	72	0	195	0	281	0
<i>Calliphora</i> spp.	0	302	6	150	14	98	20	550
<i>Lucilia fumicosta</i>	0	14	0	15	1	10	1	39
<i>Lucilia cuprina</i>	0	2	0	0	0	0	0	2
<i>Lucilia sericata</i>	0	2	0	4	0	0	0	6
<i>Lucilia sinensis</i>	0	1	0	0	0	0	0	1
<i>Lucilia andrewsi</i>	0	10	0	27	7	13	7	50
<i>Lucilia ampullacea</i>	0	1	0	5	1	3	1	9
<i>Lucilia illustris</i>	0	0	0	0	0	1	0	1
<i>Lucilia porphyrina</i>	0	1	0	2	4	2	4	5
<i>Lucilia papuensis</i>	0	8	0	6	0	2	0	16
<i>Lucilia</i> spp.								
Total	1202	351	1111	226	874	149	3187	726

**Table II. Comparison of sarcophagid fauna recovered from traps and from pupae during winter season, 2003-2004.**

Species	December		January		February		Total	
	Pupal data	Trap data	Pupal data	Trap data	Pupal data	Trap data	Pupal data	Trap data
<i>Sarcophaga calicifera</i>	156	3	6	1	0	2	162	6
<i>Sarcophaga haematodes</i>	332	1	0	16	0	11	332	28
<i>Sarcophaga walayari</i>	82	1	2	0	0	0	84	1
<i>Sarcophaga basiseta</i>	1	0	0	0	0	0	1	0
<i>Sarcophaga peshelcis</i>	0	1	0	0	0	0	0	1
<i>Sarcophaga basalis</i>	0	1	0	1	0	1	0	3
<i>Sarcophaga gravely</i>	0	3	0	0	0	2	0	5
<i>Sarcophaga futilis</i>	0	1	0	0	0	0	0	1
<i>Sarcophaga orientaloid</i>	15	0	6	0	0	0	21	0
<i>Sarcophaga ballardi</i>	299	0	7	0	0	0	306	0
Total	885	11	21	18	0	16	906	45

**Table III. Comparison of Calliphoridae and Sarcophagidae recovered from traps and from pupae during winter season, 2003-2004.**

Species	December		January		February		Total	
	Pupal data	Trap data	Pupal data	Trap data	Pupal data	Trap data	Pupal data	Trap data
Calliphoridae	1202 (93.1%)	351 (96.9%)	1111 (98.1%)	226 (92.6%)	874 (100%)	149 (90.3%)	3187 (77.9%)	726 (94.1%)
Sarcophagidae	88 (06.9%)	11 (03.1%)	21 (01.9 %)	18 (07.4%)	0 (00.0 %)	16 (09.7%)	906 (22.1%)	45 (05.9%)
Total	1290	362	1132	244	874	165	4093	771

from pupae) and the flies which were trapped but either could not lay their eggs or their immature stages were destroyed by physical and biological factors (flies obtained exclusively from traps) might have visited the traps to lay their eggs and escaped away afterwards, so we would not capture them perhaps because the traps might have some fault as any trap could be far from perfect. In the latter case the flies that were caught by the traps but not represented in the pupal data (flies recovered exclusively from traps), the flies visited the traps, either did not lay their eggs and were captured or laid the eggs but eggs of these flies, maggots or prepupae emerged from eggs and pupae might be attacked by egg parasitoids, larval parasitoids and pupal parasitoids, respectively. The immature stage of flies might have faced the attack of predators like ants, spiders, and crows. Another reason might be that these species might be less tolerant to severe cold and thus died. The species of flies common to both types of data were *Calliphora vicina*, *C. vomitoria*, *Lucilia fumicosta*, *L. cuprina*, *L. sericata*, *L. sinensis*, *L. andrewsi*, *L. ampullacea*, *L. illustris*, *L. porphyrina*, *L. papuensis*, *Sarcophaga calicifera*, *S. haematodes*, *S. walayari*, *S. basiseta*, *S. peshelcis*, *S. basalis*, *S. gravely*, *S. futilis*, *S. orientaloid* and *S. ballardi*. The species exclusive to trap data were *S. basiseta*, *S. orientaloid* and *S. ballardi* whereas species exclusive to pupal data were *S. peshelcis*, *S. basalis*, *S. gravely*, *S. futilis*, *C. vornitoria*, *L. sinensis*, *L. andrewsi*, *L. ampullacea*, and *L. porphyrina*.

To conclude a total of three genera and twenty-one species of calliphorid and sarcophagid flies were found to occur in the study area. The two genera *i.e.* *Calliphora* and *Lucilia* belonged to Calliphoridae and one genus *i.e.* *Sarcophaga* belonged to Sarcophagidae. Assuming that the species obtained from two sources represent the calliphorid and sarcophagid fauna the traps are about 85% efficient as only three out of twenty one species could not be trapped.

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