Monitoring of House Fly Population by Baited Jug Traps Method in Narrow Caged and High Rise Caged Layer Houses of Namakkal District, Tamilnadu

Tamilam Vembuvizhivendan[1] and Thangavel Kandasamy[2]

[1]Assistant Professor, [2]Assistant Professor and Head,
Avian Disease Laboratory, Thalaivasal-636112

Article Received on 19.09.2017 *Article Published on 09.10.2017*

Abstract

The house fly is considered the major pest species associated with poultry manure especially in caged layer operations. Namakkal area is the chief poultry belt of Tamil Nadu. Intensity of house fly population in narrow caged layer houses and high rise caged layer houses was monitored from June 2007 to May 2008 by baited jug trap method. In poultry farms, the intensity of house fly population was low to moderate from June to August but increased during the months of October and November in narrow caged layer houses while high rise caged layer houses witnessed a very high level of fly population during the months of September and October. The fly population was found to be low throughout the winter season. After that, a steady rise in the fly intensity was noticed from March to May'08. A marked variation in the fly population was observed between narrow caged layer houses and high rise caged layer houses.

Keywords: *House fly, Baited Jug trap, Caged layer, House fly monitoring, Musca domestica*

Introduction

Poultry industry plays a major role in the production of protective and nutritious food for human beings. The potential for further growth of this industry is obvious in view of the value of eggs and meat, which would go a long way in meeting the protein needs of growing population of India.

The high density, confined housing systems creates conditions that favour the proliferation of arthropods at a fast pace. Although several kinds of flies are present, the house fly is considered to be the major pest species associated with poultry farms especially in caged layer operations and having possible impact on the health of the population (Dogra and Aggarwal, 2010). In caged housing systems, manure is allowed to accumulate in pits beneath the cages, as large piles, for longer period. Leakage of waterers keeps the manure in moist condition thereby providing an ideal habitat for house fly breeding. On the other hand, it discourages multiplication of manure dwelling beneficial arthropods that prey on house fly eggs and larvae. Hence, fly menace becomes a recurrent problem in poultry farms.

The heavy fly population in caged layer operations leave faecal and regurgitation spots causing more rapid erosion of metal cages, degradation of paints, reduced illuminations and dirty eggs. Problems associated with flies in a poultry farms include increased incidence

of helminthic infection, especially tapeworms and increased incidence of fowl cholera and fowl typhoid. Also, flies are suspected of harbouring numerous pathogenic organisms thereby posing public health hazard to humans (Gerry *et al.,* 2011). With today's concerns about environmental conditions, fly control takes on added importance. Therefore, fly control has become imperative and should be an integral part of poultry farming. This study was carried out to monitoring of house fly population for implementing the control measures in poultry farms

Materials and Methods

In this study, the adult house fly population was monitored in narrow caged layer houses and high rise caged layer houses at Namakkal, from June 2007 to May 2008 by baited jug trap method. In the baited jug trap, two commercially available insecticides viz., Methomyl and Cartap were mixed with jiggery and rice bran and used as baits.

Composition of Bait

(Burg and Axtel, 1984)

Methomyl / Cartap : 0.4 g
Jaggery : 12 g
Rice bran : 12.6 g

Approximately 25 g of freshly prepared baits were placed in a petridish kept inside a bucket with four access holes situated at upper third of the jug and were suspended in farms (**Plate 1**).

Fly Monitoring Procedure

Fly intensity was monitored in four farms which included two narrow caged layer houses and two high rise caged layer houses. Six numbers of bait-laden buckets were placed at different locations of poultry shed viz., near the feed trough (narrow caged layer houses) and pillars (high rise caged layer houses). After 24 hours these were collected and brought to the laboratory for counting. Dead flies in the jug trap were counted and average was calculated (Plate 1.2). The fly intensity was monitored at monthly intervals in all the four farms. The climatic data related to rainfall, relative humidity and temperature were collected to determine the seasonal influence on the fly intensity. The fly intensity in this study was graded with some modification as reported by Rutz and pitts (1993).

S.No.	Grade	Baited jug trap (No. of flies per trap)
1.	Low	below 350
2.	Moderate	351 to 1000
3.	High	1001 to 1500
4.	Very high	above 1500

Results and Discussion

Fly intensity in poultry farms was monitored from June'07 to May'08. During the study period, meteorological data, including rainfall, relative humidity and temperature were collected to relate the seasonal influence on fly intensity and the data are presented in **Table I.**

Table 1: Meteorological data of Namakkal district during June 2007 - May 2008

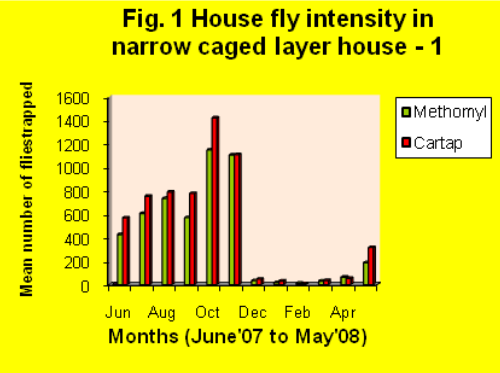
Months	Temperature		Relative humidity		Rainfall (mm)
	Max (Celsius)	Min (Celsius)	Max (%)	Min (%)	
June'07	34.6	25.1	70.0	28.0	7.0
July'07	34.1	24.4	64.0	35.0	9.0
August'07	33.8	24.1	65.0	34.0	103.0
September'07	33.4	24.4	65.0	37.0	40.0
October'07	31.6	23.4	96.0	33.0	249.2
November'07	31.2	21.4	77.0	24.0	35.2
December'07	29.3	19.0	96.0	42.0	166.5
January'08	30.8	18.2	58.0	40.0	5.0
February'08	33.2	20.5	60.0	27.0	--
March'08	32.9	21.2	92.0	23.0	83.0
April'08	36.1	24.3	77.0	29.0	7.0
May'08	37.9	25.0	65.0	25.0	23.5

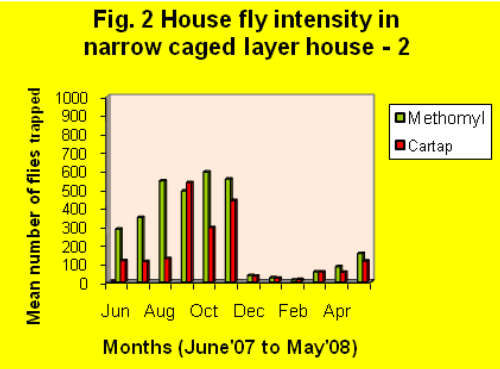
Fly intensity in narrow caged layer houses

Fly monitoring study was carried out on two narrow caged layer houses by baited jug trap method. The results of the study are presented in **Table II & Figures 1 & 2.**

Table 2: Seasonal trends of the mean numbers of house flies collected per baited jug trap in two narrow caged layer houses

Months	Farm – I		Farm - II	
	Methomyl	Cartap	Methomyl	Cartap
June'07	427 ± 20	570 ± 47	285 ±178	115 ± 26
July'07	607 ± 137	754 ± 287	348 ± 215	110 ± 40
August'07	735 ± 37	789 ± 139	546 ± 100	126 ± 20
September'07	572 ± 150	778 ± 301	491 ± 397	536 ± 369
October'07	1148 ± 339	1422 ± 442	593 ± 383	293 ± 280
November'07	1106 ± 146	1108 ± 440	555 ± 448	439 ± 340
December'07	34 ± 7	47 ± 14	35 ± 13	32 ± 5
January'08	18 ± 3	31 ± 4	23 ± 4	20 ± 3
February '08	12 ± 6	09 ± 2	11 ±1.0	14 ± 5
March'08	30 ± 6	36 ± 15	54 ±13	54 ± 20
April'08	64 ± 26	54 ± 24	82 ± 6	53 ± 4
May'08	187 ± 37	317 ± 32	154 ± 13	113 ± 17



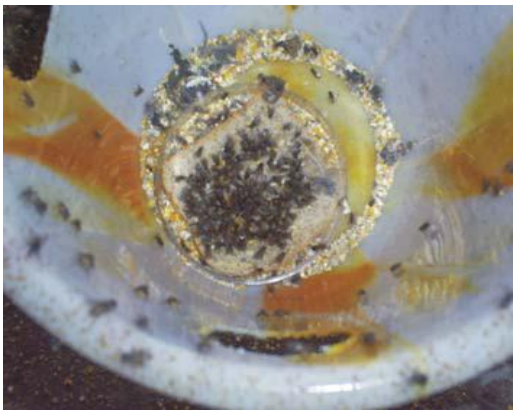


Two commercially available insecticides viz., Methomyl and Cartap were used in jug trap, as bait materials for monitoring fly population and the results are furnished in Table II. In Farm I, both type of baits had trapped moderate number of flies (427 ± 20 to 572 ± 150 in Methomyl and 570 ± 47 to 778 ± 301 in Cartap) from June to September and thereafter the number of flies caught in the traps rose to a peak during the month of October (1148 ± 339 in Methomyl and 1422 ± 442 in Cartap). Fly counts in the jug traps was on the decline during the winter months and plummeted to low levels (34 ± 7 to 12 ± 6 in Methomyl and 47 ± 14 to 9 ± 2 in Cartap) in February 2008. Afterwards a steady increase in the fly counts was recorded from March'08 to May'08.

In Farm II, both traps caught low to moderate number of flies (285 ± 178 to 555 ± 448 in Methomyl and 115 ± 26 to 439 ± 340 in Cartap) from June to November followed by low fly intensity (35 ± 13 to 11 ± 1 in Methomyl and 32 ± 5 to 14 ± 5 in Cartap) during the winter months. Following summer showers, fly counts began to increase as observed in Farm I. The results of the fly monitoring on narrow caged layer houses revealed higher fly problems in Farm I as compared to Farm II (**Plate 2**).

Plate 1: Hanging of baited jug trap and spot card in a caged layer house

Plate 2: Dead flies trapped in the baited jug trap

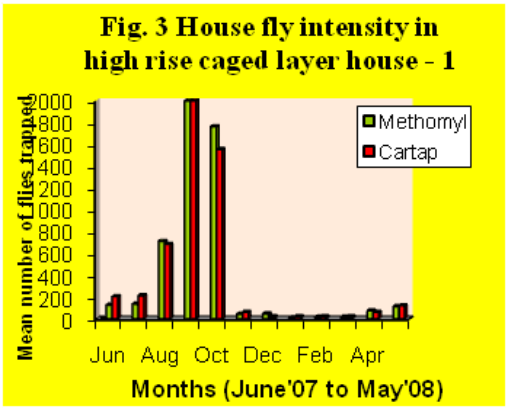


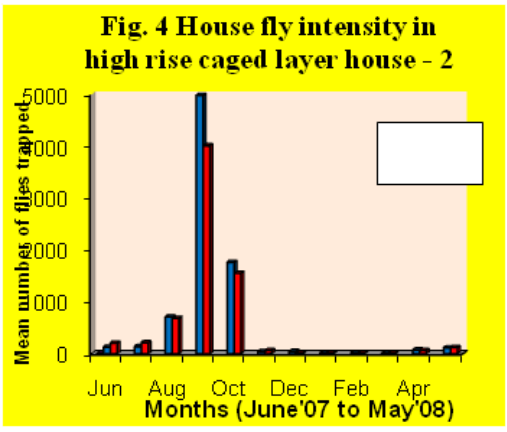
Fly monitoring in high rise caged layer houses

Fly monitoring was carried out on two high rise caged layer houses by baited jug trap method. The results are presented in Table III & Figs 3 & 4.

Table III Seasonal trends of the mean numbers of house flies collected per baited jug trap in two high rise caged layer houses

Months	Farm – I		Farm - II	
	Methomyl	Cartap	Methomyl	Cartap
June'07	181 ± 121	494 ± 141	129 ± 24	206 ± 67
July'07	125 ± 57	669 ± 51	139 ± 42	215 ± 40
August'07	822 ± 362	729 ± 200	713 ± 213	685 ± 182
September'07	1607 ± 1205	883 ± 297	4984 ± 2496	4013 ± 1585
October'07	1933 ± 703	921 ±170	1763 ± 1076	1555 ± 407
November'07	84 ± 40	73 ± 35	45 ± 18	64 ± 19
December'07	25 ± 15	31 ± 15	49 ± 28	22 ± 3
January'08	13 ± 2	17 ± 4	14 ± 1	24 ± 3
February '08	09 ± 4	20 ± 3	19 ±3	23 ± 8
March'08	16 ± 4	21 ± 4	20 ± 3	22 ± 9
April'08	75 ± 7	67 ± 16	76 ± 24	64 ± 12
May'08	132 ± 40	73 ±11	115 ± 18	123 ± 14





In Farm I, Methomyl incorporated bait caught low to moderate number of flies (181 ± 121 to 822 ± 362) from June'07 to August'07. Thereafter the number of flies trapped increased to 1607 ± 1205 in September and reached a peak in October (1933 ± 703). In contrast, Cartap incorporated jug trap was found to trap moderate number of flies (494 ± 141 to 921 ± 170) from June to October. Both type of traps, however, caught less number of flies through the winter months. The mean number of flies collected in Methomyl and Cartap trap during the month of February was 9 ± 4 and 20 ± 3 respectively.

In Farm II, both Methomyl and Cartap incorporated jug traps, caught low to moderate number of flies (129 ± 24 to 713 ± 213 and 206 ± 67 to 685 ± 182) from June to August. The fly counts then soared to a very high level (4984 ± 2496 in Methomyl and 4013 ± 1585 in Cartap) in September followed by a marked reduction (1763 ± 1076 in Methomyl and 1555 ± 407 in Cartap) in October. Thereafter, the

mean number of fly counts gradually declined and reached to a low level of 19 ± 3 and 23 ± 8 in Methomyl and Cartap bait respectively in February. In this farm, both traps showed increased fly counts beyond March as recorded in other farms.

Influence of seasonal variations on fly intensity

The overall data collected in this study signifies the influence of seasons on fly intensity. The fly intensity was low to moderate from June to August when Namakkal district had an average temperature of 33 to 34^{o}C, relative humidity of 65 to 70 per cent and minimum rainfall. Following onset of monsoon (temperature 31^{o}C and relative humidity 77 to 96 per cent), the fly intensity shot up in October and November in narrow caged layer houses and in September and October in high rise caged layer houses. A drastic reduction in fly intensity was observed from December to February in view of low relative humidity with either high rainfall or no rain during that period. The fly population again increased from March onwards, presumably owing to return of favourable conditions that are (Temperature 32.9^{o}C, relative humidity 92 per cent with 83 mm rainfall) ideal for fly breeding. The results of the present study clearly indicates that fly population increased whenever Namakkal district experienced an average temperature of 30 to 32^{o}C, relative humidity >75 per cent and short spells of rainfall.

These observations are akin to the findings of Learmount *et al.,(*2002) who reported that prevailing weather conditions (temperature and humidity) might directly influence fly breeding that leads to fluctuation in fly intensity. During winter months, the life cycle of house fly gets extended to 30 days leading to reduction of house fly population below nuisance levels. Significant reduction in egg laying capacity of female house flies coupled with prolongation of life cycle as the reason for reduced house fly population in poultry farms during winter seasons (Sathiyamoorthy *et al.,* 2018).

Baited jug traps

The mean number of flies trapped in the baited jug traps, in both type of houses, significantly correlated with actual changes in the fly population. According to Lysyk and Axtell (1985), the baited jug trap is reasonably selective and indices obtained by this method are related to actual density of house flies. However, the number of flies trapped in Farm I was significantly higher than in Farm II (narrow caged layer house) during the months of October and November. Similarly, three-fold increase in fly collection was observed in Farm II (High rise caged layer house) than Farm I in September and October. This might be due to influence of position and location of traps in the farms. This is in accordance with findings of Burg and Axtell (1984) who observed more flies in the baited jug traps when positioned close to manure surface and they attributed collection of more flies to the presence of chemical attractants and dead flies in the baits.

In this study, fly population index markedly varied between narrow caged layer house and high rise caged layer house. This finding suggests that the type of housing had an influence on fly population. The results of the present research confirm the findings of Sathiyamoorthy *et al.,* (2018), who reported widely varying fly population depending on the type of houses while studying the correlation between sticky ribbons, baited jug trap and spot card technique in three types of houses. A widely accepted view is that fly abundance in caged layer facilities is determined mainly by manure water content through direct positive effect on fly oviposition and larval survival.

Summary

The data collected in this study, revealed low to moderate fly population from June to August followed by a high level of fly activity during the months of October and November in narrow caged layer houses and during the months of September and October in high rise caged layer houses. The fly population then began to decline in December in both types of houses and reduced to a very low level in February. After a period (December to February) of lull in their activities, the fly population began to increase beyond the middle of the March following short spells of rainfall and continued till the end of this study. In the present study, a marked variation in the fly population was observed between narrow caged layer houses and high rise caged layer houses. Increased fly population in the narrow caged layer houses could be due to the increased moisture of the manure which favours fly breeding. Moreover due to poor ventilation, improper manure management also increase in moisture favours for fly breeding in narrow caged layer houses and in contrast to this high raised layer houses had less fly population due to good ventilation and reduced moisture due to proper manure management.

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