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ANALYSIS

Prevalence of house fly pupal parasitoids in Namakkal, Tamil Nadu

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Prevalence of house fly pupal parasitoids in Namakkal, Tamil Nadu

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ABSTRACT

The obscured challenging factor that interferes with cow economy is the health hazard caused by filth flies, especially house fly *Musca domestica*. The most important harm is annoyance and the indirect harm is the potential transmission of pathogens (viruses, bacteria, fungi, protozoa and nemetodes). Pathogenic organisms picked up by house flies from garbage, sewage and other contaminated sources are transferred through their vomitus, faeces and contaminated external body parts to cow and their products, thereby indirectly influences the cattle farmer's income. Hence, control of *Musca domestica* is vital to cow based economy and human health. Control of house flies using pupal parasitoids is one of the best eco-friendly biological control tools in Integrated Pest Management (IPM). In this perspective, the present study was carried out in Namakkal, Tamil Nadu to survey the parasitoids of house fly pupae. The prevalence of pupal parasitoid of house fly was identified by collection of naturally parasitized house fly pupae from four poultry house manure, during the period September 2007 to November 2007. A total of 3547 house fly pupae were sampled and out of this 691 pupae were found to be parasitized (19.48%). The parasitoids identified were *Spalangia endius* (79.88%), *Dirhinus himalayanus* (18.82%) and *Pachycrepoideus vindemiae* (1.30%).

Key words: House fly, biological control, parasitoids

INTRODUCTION

The obscured challenging factor that interferes with cow economy is the health hazard caused by filth flies, especially house fly *Musca domestica*. The accumulation of cattle, horse and poultry manure facilitates breeding of flies, especially the house fly, *Musca domestica* which is the predominant pest in manure. House flies have a great reproductive potential and one female house fly can lay up to 500-900 eggs (Bay and Harris, 1988). The number of generations per year may vary from 30 under tropical conditions to 10 or less in temperate climates and one kg of manure can produce around 5,000-10,000 flies (Keiding, 1974). The most important damage related with this insect is the annoyance and the indirect damage is the potential transmission of pathogens (viruses, bacteria, fungi, protozoa and nematodes). Pathogenic organisms are picked up by flies from garbage, sewage and other sources of filth and then transferred through their vomitus, faeces and contaminated external body parts to cow and their products, thereby indirectly influences the cattle farmer's income. In addition, house flies are considered a nuisance; as they annoy residents living in the vicinity of farms resulting in poor community relations and possible litigation. Hence, control of *Musca domestica* is vital to livestock and human health.

In the twentieth century, control of house flies depended mainly on insecticides, but allied problems such as residues in food and manure and development of resistance to insecticides in the flies propelled the researchers to search for alternative control. An alternative control strategy is Integrated Pest Management (IPM), which uses techniques like cultural, biological and chemical control to reduce the pest below the nuisance level. The most common biological control agents for house flies are parasitoid wasps. The parasitoids are group of insects that develop as larvae on the tissues of other arthropods which they ultimately kill.

In India, data on house fly parasitoids are limited. Control of house flies using pupal parasitoids is one of the best eco-friendly biological control tools in Integrated Pest Management (IPM). In this perspective, the present study was carried out in Namakkal, Tamil Nadu to survey the parasitoids of house fly pupae that occur naturally in poultry manure.

MATERIALS AND METHODS

Study areas

The manure samples from four caged layer poultry houses in Namakkal, Tamil Nadu were chosen for the study.

Natural parasitism of house flies pupae by parasitoids

House fly pupae found in accumulated poultry manure in the four poultry farms were sampled for parasitoids from September 2007 to November 2007. The manure samples were collected randomly from five places at weekly intervals. Samples were placed in a one litre container; water added and the mixture was stirred so that pupae could float to the surface. The pupae that floated to the surface were collected on a sieve and later kept on absorbent papers for few hours to remove traces of water. Later, the pupae were kept in 135 ml transparent plastic containers in the laboratory at room temperature for 30 days to await the emergence of flies and / or parasitoids. The transparent plastic containers were perforated with needles to facilitate aeration. After 30 days, the uneclosed pupae were dissected and examined microscopically for parasitoids or evidence of parasitism. Pupae containing dead parasitoids were considered as parasitized. Percentage of parasitism was estimated weekly in each house using the method of Petersen (1986).

$$\text{Percentage parasitism} = \frac{\text{Emerged + Aborted parasitoid}}{\text{Intact pupae}} \times 100$$

The parasitoids emerged were identified as per keys provided by Rueda and Axtell (1985) and Narendran (1989).

Statistical analysis

The monthly (September 2007 to November 2007) prevalence of house fly pupal parasitoids *Spalangia endius, Dirhinus himalayanus* and *Pachycrepoideus vindemiae* was analysed by Chi square test (Sokal and Rohlf, 1995).

RESULTS

A survey on the parasitoids attacking *Musca domestica* at four poultry house manure at Namakkal from September 2007 to November 2007 indicated the prevalence of three species, viz., *Spalangia endius*, *Dirhinus himalayanus* and *Pachycrepoideus vindemiae*.

A total of 3547 house fly pupae were sampled, of these, 691 pupae were parasitized (19.48%) (Table 1). Mean relative abundance of each species was *Spalangia endius* (79.88%), *Dirhinus himalayanus* (18.82%) and *Pachycrepoideus vindemiae* (1.30%). Among the three parasitoid species, *S. endius* was the most predominant.

During the three month study period in poultry houses, per cent parasitism of naturally occurring pupae was highest in November 2007 and increased from 13.2% in September to 33.9% in November 2007 (Table 1).

The species wise parasitism of naturally occurring pupae increased from 72.9% in September to 85.4% in November for *S. endius*. However, the per cent parasitism that was 25.9% and 1.2% respectively for *D. himalayanus* and *P. vindemiae* in September. The percent parasitism was decreased to 15.3% for *D. himalayanus* and increased for *P. vindemiae* to 1.5% in October, also declined to 13.4% (*D. himalayanus*) and 1.2% (*P. vindemiae*) in November 2007 (Table 2).

The month wise prevalence of house fly pupal parasitoids under natural conditions in poultry manure showed a significant difference ($P<0.01$).

DISCUSSION

A survey on the parasitoids attacking *Musca domestica* at four poultry houses manure at Namakkal indicated the prevalence of *Spalangia endius*, *Dirhinus himalayanus* and *Pachycrepoideus vindemiae.* Previous studies by Karunamoorthy (1987) had revealed the prevalence of the above three parasitoids in Tamil Nadu, India. The prevalence of *Spalangia cameroni* and *S. endius* in Tamil Nadu (Jebanesan and Sangeetha, 2005) have been reported earlier. The prevalence of *D. himalayanus* in India has been reported by Narendran, 1989 and Bai, 1990. *Pachycrepoideus vindemiae* was reported from a poultry house at Pondicherry

(Panicker and Srinivasan, 1986). Srinivasan and Balakrishnan (1989) reported that *P. vindemiae* was prevalent only at certain times in a year and not throughout in the poultry houses.

Karunamoorthy (1987) reported that the mean relative abundance of each species was 20.32% for *D. himalayanus*, 14.08% for *S. endius* and 1.78 for *P. vindemiae*. In the present study, *S. endius* was the most abundant parasitoid (79.9%) followed by *D. himalayanus* (18.8%). However, Karunamoorthy (1987) reported that *D. himalayanus* was the predominant parasitoid in poultry manure. Although the relative abundance of *S. endius* is at variance, the relative abundance of *P. vindemiae* is very much similar to the earlier report at Namakkal, Tamil Nadu (Karunamoorthy, 1987). In another report, the mean relative abundance of *S. cameroni* and *S. endius* was recorded as 84.26% and 15.74% respectively in Chidambaram, Tamil Nadu, during October and November (Jebanesan and Sangeetha, 2005).

In the present study, the field pupae parasitized by *S. endius* (85.4%) was highest in November 2007 and in September 2007 for *D. himalayanus* (25.9%). However, Srinivasan and Balakrishnan (1989) stated that the population of *D. himalayanus* was maximum in November.

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Table – 1

Number and percent parasitism of house fly pupal parasitoids under natural conditions in poultry manure

Period	Pupae sampled	Parasitized	
		No.	%
September '07	1953	258	13.2
October '07	1089	262	24.1
November '07	505	171	33.9
Total	3547	691	19.48

Table - 2

Number and percent prevalence of house fly pupal parasitoids under natural conditions in poultry manure

Period *	No. of parasitoids emerged and % prevalence					
	S. endius		*D. himalayanus*		*P. vindemiae*	
	No	%	No	%	No	%
September'07	188	72.9	67	25.9	3	1.2
October'07	218	83.2	40	15.3	4	1.5
November'07	146	85.4	23	13.4	2	1.2

Note: * ($P<0.01$) χ^2 value = 14.123