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Seasonal Distribution and Characterization of Breeding Sites of House Fly *Musca domestica* (L.) and Stable Fly *Stomaxy calcitrans* (L.) (Diptera: Muscidae) in Dairy Farm in the Central Region of Saudi Arabia

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ABSTRACT

Distribution and breeding sites of house fly and stable fly pupae and larvae were studied in six sites, three of them were inside and three were outside pens, in two dairy farms near Alkarij City in the central region of Saudi Arabia from February 1997 to February 1998. Pupae of both species were significantly higher outside pens than inside. In contrast, larvae for both species were higher inside farm than outside. Pupae and larvae were most abundant under silage mound and feed apron, respectively. The peak abundance of pupae were recorded in spring and winter, whereas larvae was most abundant in spring and fall. Possible explanation for this was discussed in the paper.

Key words: Insecta, house fly, stable fly, Saudi Arabia

INTRODUCTION

House fly *Musca domestica* (L.), and stable flies *Stomoxys calcitrans* (L.), are important economical pests of dairy cattle. Stable fly has been reported to cause reductions in weight gains and production loses for dairy cattle (Campbellet *et al.*, 1977) On the other hand, house fly is important as a nuisance to cows and workers as well as being diseases vector (Meyer and Petersen, 1983; Meyer and Schultz, 1990). Effective control for these flies requires sanitation to reduce larval development sites, this requires knowledge of the preferred breeding sites of each species as well as the seasonal trends in abundance of both species (Lysyk, 1993). Larval

development sites include feed aprons, manure wounds, and side fences (Skoda *et al.*, 1991). These sites may vary among geographic locations (Meyor and Peterson, 1983). This study examined the spatial, seasonal distribution and characterization of breeding sites of the housefly and stable fly pupae and larvae for defining control actions against these pests.

MATERIALS AND METHODS

Sampling:

Two dairy farms located 20 km south of Alkarij City were sampled for stable and house fly pupae and larvae from February 1997 to February 1998. To determine the abundance of pupae and larvae in the development sites, one pen was chosen in each farm and two samples (one liter each) were taken every two weeks from six sampling sites, three inside the pen and the other three outside. These inside samples were feed apron (FA), general lot (GL) and under fences (UF) (Fig.1). The outside samples were from stored manure (SM), manure mixed with milk drained from the milking-parlor (DD) and under the silage mound (US) every two weeks. Samples were scooped into bags and put in a container with ice and transported to the laboratory. Larvae and pupae were extracted from sample by hand. Identification of pupae were based on characteristics of candal spiracles (Skidmore, 1985; Peterson, 1960). House fly and stable fly larvae were put in one category and not separated because it is difficult to do so in the early stages.

Data Analysis:

Abundance of house fly and stable fly pupae and larvae at different sites were compared using the least significant difference (LSD) test. Regression procedures were also used to examine the change in the number of immature stages related to environmental conditions (Mean high temperature, relative humidity, and rainfall). SAS procedures (1982) were used in each analysis at level of $P>0.05$.

RESULTS

Population density trends of flies in the two farms were identical, therefore the results of both farms were combined. Housefly pupae were recovered from all sites inside and outside pens in both farms.

House fly pupae were more abundant (59.2) at (US) than other sites (Table 1). The density of stable fly pupae was low with more abundance (3.19) at (US) sit.

The numbers of larvae of both species were significantly ($P<0.05$) higher inside pens than outside (Table 1). FA had the highest number of larvae (140.1) of all six sites (Table 1). In contrast, (FA) had the least number of house fly and stable fly pupae. In general, both house fly and stable fly pupae accumulate outside pen and the larvae inside in both farms.

Th weather conditions of temperature and relative humidity play an important rule on the population density of both species. The density of house fly pupae was higher in spring and winter and low in summer in all farms (Table 2). Similarly, stable fly pupae density was high in spring and winter and low in fall and summer in all sites (Table 2). However, house fly and stable fly larvae were significantly high in spring and fall and lower in summer and winter (Table 2). Regression test showed no correlation between number of larvae and pupal stages with all environmental conditions.

DISCUSSIONS

In both farms the feed apron had the highest number of house fly and stable fly larvae, at the same time it had the least number of pupae. Skoda *et al.*, (1993 and 1991) studied both larvae and pupae of house fly and stable fly in different sites and found that feed apron yielded the highest number of immature house flies and stable flies.

In our study stored manure had few immature stages of either fly. This disagreed mat with (Meyer and Petersen, 1983) who found that stored manure had high number of both species pupae. This probably due to the dryness of stored manure which make it undesirable for flies to breed.

Silage mound sites had the highest numbed of pupae of both flies and the lowest number of larvae. In contrast, Lysyk (1993) found that the number of larvae of both species was high in silage mounds, general lots, and few from feed apron. This difference may be related to the differences in weather conditions between both experiments.

The density of both species pupae changed randomly through the season. The number of pupae increased during the spring, decreased in during the summer and fall, and then increased in the winter. However, the number of larvae increased in the spring and the fall and decreased in the summer and the winter. This may be explained that when the temperature become moderate in the fall, adult females of both flies lay a high number of eggs that hatch and give a high number of larvae in the winter. In fact, in the winter adults die and larvae pupate and this can explain the changes in density between pupae and larvae in different seasons. LaBrecque *et al.*, (1972) found that the density of both species changed gradually, increasing during spring, stabilizing during summer and early fall until the following spring.

Generally, analysis showed that FA was the predominant site for larvae and US had the highest number of pupae of both species. So, removing manure accumulated at FA, particularly early in the spring could reduce house fly and stable fly populations. Sampling for both species larvae at FA could allow predication of adult numbers in the future. Recognition of the importance of management and sanitation in controlling fly development can only enhance the overall goal of fly control.

More research is needed to determine the alternative development sites outside pens.

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مجلة الإمارات للعلوم الزراعية (١٩٩٨)١٠:١٦-٢٣

التوزيع الموسمي وصفات أماكن توالد الذباب المنزلي (L.) *Musca domestica* وذبابة الإسطبلات (L.) *Stomaxy calcitrans* في مزارع الألبان في المنطقة الوسطى في المملكة العربية السعودية

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تم دراسة التوزيع الموسمي ليرقات وعذارى الذبابة المنزلية *Msca domestica* (L.) وذبابة الإسطبلات (L.) *Stomaxy calcitrans* في ستة مواقع. ثلاثة داخل الحظائر وثلاثة خارجها، في مزرعتين لإنتاج الألبان قرب مدينة الخرج في المنطقة الوسطى في المملكة العربية السعودية من شهر فبراير ١٩٩٧ إلى شهر فبراير ١٩٩٨. كانت أعداد العذارى لكلا النوعين أعلى خارج الحظائر من داخلها. أما أعداد اليرقات فقد كانت أعلى داخل الحظائر وكانت الفروق معنوية. كانت أكثر المواقع وفرة بالعذارى لكلا النوعين هي تحت أكوام الأعلاف الجافة ثم المنطقة القريبة من المحلب وأخيرا أكوام الروث وكل هذه المواقع تقع خارج الحظيرة. أما بالنسبة لليرقات فكانت أكثر في داخل الحظائر في المنطقة القريبة من أماكن أكل الحيوانات ثم وسط الحظيرة وأخيرا تحت أسوار الحظيرة. أعداد العذارى للذباب المنزلي وذبابة الإسطبلات كانت أعلى في الربيع والشتاء بينما اليرقات فكانت أعلى في الربيع والخريف. ولقد تمت مناقشة الأسباب المحتملة للنتائج في البحث.

Table 1. Mean numbers (±SD) of house fly (HF) and stable fly (SF) pupae and larvae per sample.

Pen	Site	No. of HF Pupae	No. of SF Pupae	No. Larvae*
Inside	FA	1±1.4c	0.1±0.2c	140.1±177.3a
	GL	5±5.15bc	1.2±2.0bc	88.9±121.5ab
	UF	2.8±3.5c	0.1±0.4c	89.6±111.6ab
Outside	SM	7.4±9.4bc	0.1±0.2c	19.8±22.9bc
	DD	16.7±10.6b	2.19±2.3ab	15.4±14.2c
	US	59.2±40.5a	3.19±2.4a	14.6±4.3c

Feed apron (FA), general lot (GL), under fences (UF) stored manure (SM), manure mixed with milk drained from milking-parlor (DD) and under silage mound (US).
Values followed by the same letter, within columns, were not significantly different P<0.05
(*) Larvae of both species

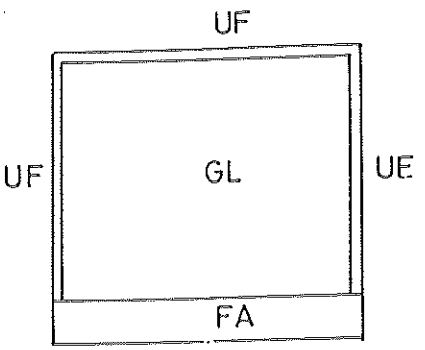

Fig. 1. Sites inside pen. Feed abron(FA), general lot(GL), and under fences(UF).

Table 2. Mean numbers (±SD) of pupae and larvae of house fly (HF) and stable fly (SF) during different seasons.

Season	No. of HF Pupae	No. of SF Pupae	No. Larvae*
Spring	19.5±40.7a	1.8±0.7a	109.5±33.0a
Summer	6.9±8.8b	0.7±0.4ab	9.33±18.5b
Autumn	12.4±20.9ab	0.5±0.2b	113±32.7a
winter	22.5±33.7a	1.7±0.7ab	13.7±23.0b

Values followed by the same letter, within columns, were not significantly different $P<0.05$

(*) Larvae of both species