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Dipteran flies in stables in and around Bhubaneswar, Odisha

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Abstract
The study was conducted in two stables in and around Bhubaneswar, Odisha for a period of one year (July 2016 to June 2017) to determine the diversity of fly population. Out of 1320 flies collected from stables, *Tabanus* fly (28.48%) had the highest abundance followed by *Musca sp.* (26.36%), *Coproica sp.* (21.52%), *Stomoxys sp*. (11.82%), *Culex sp.*(8.79%) and *Chrysops sp*. (3.03%) Higher abundance of flies were observed during the month of July while lowest during January.

Keywords: Tabanus fly, abundance, stable

Introduction
The damage caused by insect pests on equines is a major threat to its health and productivity. Although mortality rarely occurs due to damage by insects, the major manifestations includes reduction in weight gain, anemia, increased susceptibility to infectious diseases and decreased productivity. In addition to causing direct damage, dipteran flies also act as vectors for important diseases like Trypanosomosis, Theileriosis, Babesiosis and Anaplasmosis [1]. Therefore, it is essential to concentrate on health care consequent to insects and prevent blood borne pathogens due to mechanical transmission. Since information regarding fly diversity and abundance is meagre and no systematic study has been reported with regards to seasonality and abundance pattern of the dipteran flies in horses in the region, the investigation was aimed to determine the major dipteran flies in stables across the city.

Materials and Methods
A total number of 1320 insects were collected at monthly intervals for a period of one year (July 2016 to June 2017) from two stables in and around Bhubaneswar. The flies were collected near the animal surrounding within the stable by help of an entomological net and aspirator. The flies were then killed by putting them inside a vial or bottle with 70% alcohol or cotton swabs soaked in chloroform. They were then transferred to laboratory for further procedures like preservation and identification. For identification, the flies were observed directly or from permanent mounts (dry/wet) and important features like wing venation, mouth parts, antenna, morphology of thorax and abdomen were observed by stereo microscope. The identification was based on their morphological characters [2, 3].

Results & Discussion
Out of the 1320 dipteran flies collected from stables in Bhubaneswar, the highest presence of *Tabanus* fly (28.48%) was recorded, followed by *Musca sp.* (26.36%), *Coproica sp.* (21.52%), *Stomoxys sp*. (11.82%), *Culex sp.* (8.79%) and *Chrysops sp*. (3.03%) as depicted in Figure 1.

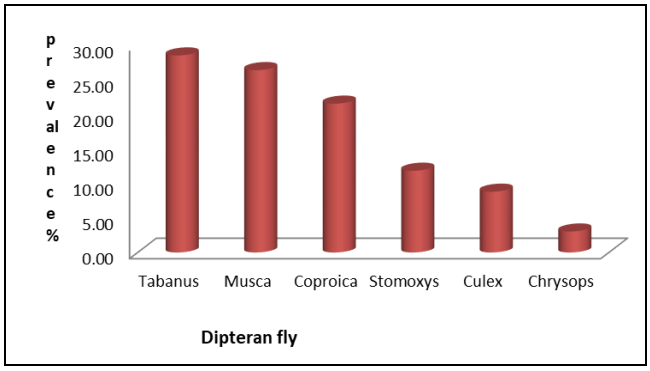

Fig 1: Prevalence of dipteran flies in stable

The highest relative abundance was recorded in the month of July where as the least relative abundance occurred during January with lower range of prevalence occurring during December to February (Figure 2). *Tabanus* fly which was the dominant fly in the stable peaked during the month of July-August while lower relative abundance was seen during the month of November to February. *Stomoxys* flies were seen in abundance during the month of May- June and *Culex* sp during July to August (Figure 3).

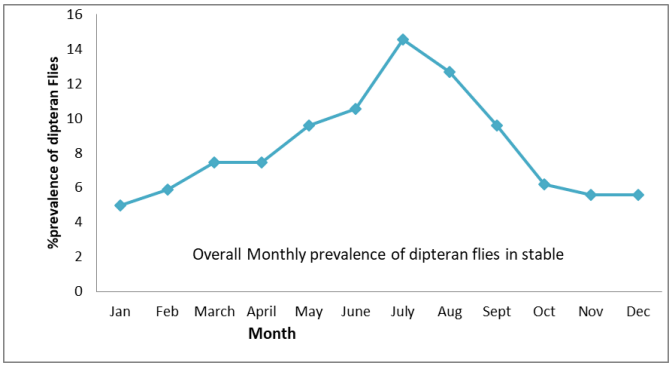

Fig 2: Overall monthly prevalence of dipteran flies in stable

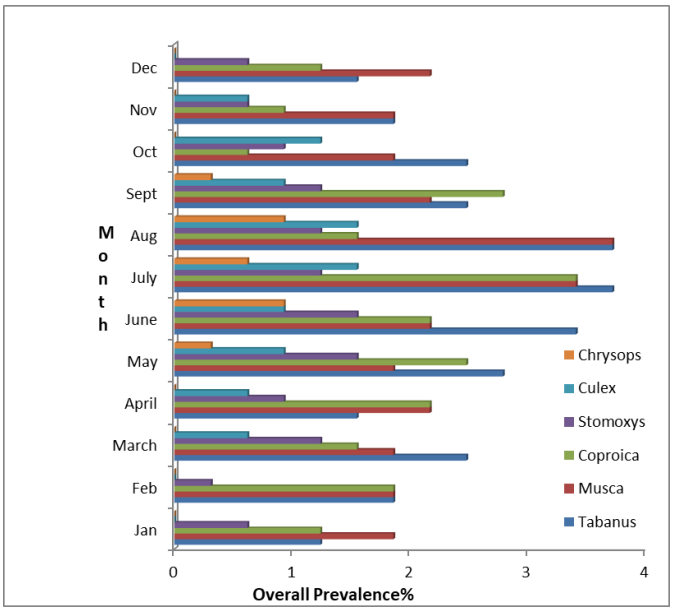

Fig 3: Month-wise prevalence% of different dipteran flies in stable

In the present study, *Tabanus* fly was found to be widely distributed and strongly associated with the horses which supports the previous finding in Brazil [4, 5] and in Turkey [6]. The prevalence of *Musca sp.* and *Coproica sp.* corroborates with the results of a study in Malaysia [7] which investigated on dipterans associated with horse dung while prevalence of *Musca* fly and *Stomoxys* fly has been reported from stables in Florida [8] and Ocala [9]. The presence of *Chrysops* fly on horse during our study is in agreement to earlier findings [5] in Brasil.

The perusal of month wise prevalence study of Tabanus fly in stables reveals results which are in agreement to reports elsewhere [6,10] who have recorded highest prevalence during May to September. It has also been indicated that activity and dispersion of *Tabanus* fly is influenced by meteorological factors, primarily luminosity and temperature [11]. Our findings is in accordance with the earlier work that investigated the seasonal abundance of Tabanids in the Pantanal region of Brazil [4, 12] and found an increase of the horse fly population during the first part of the rainy season. They also showed that when the rainfall decreased, a decrease in fly populations followed. The relatively high abundance of *Tabanus sp.* in this study could be due to higher survival index (longevity), and higher number of gonotrophic cycles [13], as well as host stressing and interrupted feeding behaviour.

Conclusion

The study indicates prevalence of dipteran flies in horses and surrounding environment of stables. The control of these flies which also act as vectors by chemical, biological and managemental measures along with a knowledge of insect biology, ecology and behaviour is essential to prevent disease of equines.

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