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Data Article

Dataset on the diversity and distribution of biting flies collected from cattle farms in Peninsular Malaysia

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A B S T R A C T

This dataset investigated the diversity, the geographic and spatial distribution of haematophagous flies collected from cattle farms in Peninsular Malaysia. Biting flies were trapped from 25 cattle farms over a one-year period. One-way Analysis of Variance (ANOVA) was used to establish the presence/absence of statistical differences in the number of flies caught in relation to the different geographic distributions (zones). Three thousand eight hundred and eighty-nine haematophagous flies comprising of 36 different species, including *Musca* species (3189; 82.0%), *Stomoxys* species (588; 15.1%), *Tabanus* species (58; 1.5%), *Chrysops* species (19; 0.5%), *Haematopota javana* (3; 0.1%), *Haematobosca* species (29; 0.7%) and *Haematobia exigua* (3; 0.1%) were collected using three different types of fly traps. More biting flies were trapped in the southwest (1070; 27.5%) and south (1045; 26.9%) zones compared to other arbitrary zones of Peninsular Malaysia. Haematophagous flies were spatially distributed both in the inland and coastal parts of the country. The difference in the catch of *Stomoxys* species within zones was not significant ($F = 1.299$; $df = 5$; $p = 0.306$), although it was highest in the southwest zone. The number of

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Musca species caught was highest in the south zone compared to other zones, the differences was not significant (F = 0.770; df = 5; p = 0.583). Tabanidae fly species were most abundant in the southwest zone, the differences among zones was not significant (F = 1.179; df = 5; p = 0.356).

Specifications Table

Subject area	Biology, Insect Science.
More specific subject area	Entomology.
Type of data	Table and Figures.
How data was acquired	Three types of fly traps (Intercept, Malaise and Nzi) were used to collect samples of haematophagous flies from 25 cattle farms. Flies were identified using a stereomicroscope (Olympus®).
Data format	Raw and Analyzed.
Parameters for data collection	Biting flies were trapped from cattle farms that had no history of using insecticides to protect cattle from biting insects. Farms with more than 50 heads of cattle were used.
Description of data collection	Haematophagous flies were collected by using 2 each of the Nzi, Malaise and Intercept traps. These fly traps were stationed in the different cattle farms for a period of at least 12 hours. The flies were collected over a year period. The trapped biting flies were preserved in 95% ethanol and transported to the Parasitology laboratory of the Faculty of Veterinary Medicine for subsequent species identification, with the aid of suitable taxonomy keys.
Data source location	Biting flies were trapped from 25 cattle farms located in the following cities/towns in Peninsular Malaysia: Perlis (6°56′ 42.1″N, 100°24′59.0″E), Sik (5°89′26.9″N, 100°65′96.1″E), Pinang (5°43′13.5″N, 100°51′02.8″E), Raub (3°97′34.8″N, 101°79′64.4″E), Cameron Highland (4°44′03.5″N, 101°38′72.5″E), Kinta Valley (4°40′01.9″N, 101°04′73.7″E), Kampar (4°38′40.5″N, 101°20′81.1″E), Air Papan (4°30′15.9″N, 101°06′67.2″E), Gopeng (4°48′25.8″N, 101°15′46.0″E), Permaisuri (5°57′67.3″N, 102°75′33.0″E), Hulu Terengannu (5°18′95.2″N, 102°99′70.2″E), Gua Musang (4°90′08.6″N, 102°02′39.9″E), Kuala Krai (5°54′90.2″N, 102°18′23.0″E), Pasir Puteh (5°83′81.8″N, 102°29′17.0″E), Serdang (2°99′.22.0″N, 101°73′27.1″E), Bangi (2°54′14.0″N, 101°44′34.0″E), Pekan Dengkil (2°85′73.8″N, 101°68′41.0″E), Jerantut (3°91′26.3″N, 102°41′05.8″E), Dungun (4°48′32.3″N, 103°23′60.9″E), Kemaman (4°17′52.0″N, 103°14′93.9″E), Mersing (2°40′34.1″N, 103°82′91.5″E), Kota Tinngi (1°66′34.4″N, 104°13′49.8″E), Pontian (1°60′36.7″N, 103°47′89.0″E), Muar (2°12′04.2″N, 102°65′23.9″E) and Labis (2°38′45.1″N, 103°01′08.1″E).
Data accessibility	Data available within this article.

Value of the Data

- This appears to be the first record on the diversity, abundance and spatial distribution of haematophagous flies on cattle farms over a wide sampling area throughout Peninsular Malaysia.
- This dataset will be of great benefit to cattle farmers, Veterinarians, Parasitologists, Statisticians, Medical Personals, the general public and the Government.
- This dataset explains the geographic and spatial distribution of the various species of biting flies infesting cattle in Peninsular Malaysia.
- This body of evidence sheds more light on the abundance and diversity of the different biting flies found in cattle farms in Peninsular Malaysia.
- This dataset shows that haematophagous flies are distributed both in the coastal and inland areas of the country.
- The findings of this dataset will be useful in the control of haematophagous flies in cattle farms which may lead to the reduction of diseases that may be transmitted by these groups of flies.

1. Data

Included in this article is a table and five figures that shows the diversity, abundance, the geographic and spatial distribution of haematophagous flies collected over a one-year period from cattle farms in Peninsular Malaysia. The species diversity, spatial distribution patterns and abundance of haematophagous flies on cattle farms in the six zones of Peninsular Malaysia is presented in Table 1. The spatial distribution patterns of *Stomoxys* species on cattle farms in Peninsular Malaysia is presented in Fig. 1. The spatial distribution patterns of *Musca* species on cattle farms in Peninsular Malaysia is presented in Figs. 2 and 3. The spatial distribution patterns of *Tabanus* species on cattle farms in Peninsular Malaysia is presented in Fig. 4. Fig. 5 shows the spatial distribution patterns of *Chrysops* species, *Haematopota javana*, *Haematobosca* species and *Haematobia exigua* on cattle farms in Peninsular Malaysia.

Table 1
Species diversity and spatial distribution patterns and abundance (numbers caught with percentage in parenthesis) of haematophagous flies on cattle farms in six zones throughout Peninsular Malaysia.

Species	Zones (%)						Total	Genus (%)	Overall (%)
	North	Northwest	Northeast	Southwest	Southeast	South			
Stomoxys	**80 (13.6)**	**100 (17.0)**	**35 (6.0)**	**188 (32.0)**	**77 (13.1)**	**108 (18.4)**	**588**	**100.0**	**15.1**
S. calcitrans	26 (10.1)	92 (35.8)	11 (4.3)	83 (32.3)	18 (7.0)	27 (10.5)	257	43.7	6.6
S. indicus	41 (23.0)	2 (1.1)	9 (5.1)	81 (45.5)	6 (3.4)	39 (21.9)	178	30.3	4.6
S. uruma	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	45 (52.9)	40 (47.1)	85	14.5	2.2
S. pulla	4 (9.8)	5 (12.2)	15 (36.6)	9 (22.0)	8 (19.5)	0 (0.0)	41	7.0	1.1
S. sistens	2 (10.0)	1 (5.0)	0 (0.0)	15 (75.0)	0 (0.0)	2 (10.0)	20	3.4	0.5
S. bengalensis	7 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7	1.2	0.2
Musca	**153 (4.8)**	**700 (22.0)**	**314 (9.8)**	**853 (26.7)**	**253 (7.9)**	**916 (28.7)**	**3189**	**100.0**	**82.0**
M. crassirostris	47 (2.2)	579 (26.7)	112 (5.2)	460 (21.2)	218 (10.1)	749 (34.6)	2165	67.9	55.7
M. inferior	90 (21.2)	78 (18.4)	23 (5.4)	116 (27.4)	3 (0.7)	114 (26.9)	424	13.3	10.9
M. conducens	0 (0.0)	7 (4.6)	83 (54.2)	44 (28.8)	12 (7.8)	7 (4.6)	153	4.8	3.9
M. sorbens	0 (0.0)	10 (9.4)	18 (17.0)	62 (58.5)	1 (0.9)	15 (14.2)	106	3.3	2.7
M. ventrosa	10 (11.0)	15 (16.5)	6 (6.6)	50 (54.9)	2 (2.2)	8 (8.8)	91	2.9	2.3
M. bakeri	3 (3.9)	9 (11.7)	38 (49.4)	26 (33.8)	0 (0.0)	1 (1.3)	77	2.4	2.0
M. planiceps	1 (2.1)	0 (0.0)	3 (6.4)	17 (36.2)	6 (12.8)	20 (42.6)	47	1.5	1.2
M. asiatica	0 (0.0)	0 (0.0)	13 (38.2)	16 (47.1)	3 (8.8)	2 (5.9)	34	1.1	0.9
M. formosana	0 (0.0)	0 (0.0)	10 (55.6)	5 (27.8)	3 (16.7)	0 (0.0)	18	0.6	0.5
M. senior whitei	2 (15.4)	1 (7.7)	1 (7.7)	9 (69.2)	0 (0.0)	0 (0.0)	13	0.4	0.3
M. fletcheri	0 (0.0)	0 (0.0)	4 (33.3)	8 (66.7)	0 (0.0)	0 (0.0)	12	0.4	0.3
M. craggy	0 (0.0)	0 (0.0)	0 (0.0)	8 (72.7)	3 (27.3)	0 (0.0)	11	0.3	0.3
M. lucens	0 (0.0)	1 (11.1)	1 (11.1)	7 (77.8)	0 (0.0)	0 (0.0)	9	0.3	0.2
M. pattoni	0 (0.0)	0 (0.0)	0 (0.0)	9 (100.0)	0 (0.0)	0 (0.0)	9	0.3	0.3
M. convexifrons	0 (0.0)	0 (0.0)	1 (12.5)	6 (75.5)	1 (12.5)	0 (0.0)	8	0.3	0.2
M. fasciatus	0 (0.0)	0 (0.0)	0 (0.0)	6 (100.0)	0 (0.0)	0 (0.0)	6	0.2	0.2
M. bezzii	0 (0.0)	0 (0.0)	1 (16.7)	4 (66.7)	1 (16.7)	0 (0.0)	6	0.2	0.2
Tabanus	**10 (17.2)**	**2 (3.5)**	**12 (20.7)**	**25 (43.1)**	**1 (1.7)**	**8 (13.8)**	**58**	**100.0**	**1.5**
T. rubidus	7 (31.8)	1 (4.5)	7 (13.8)	5 (22.7)	1 (4.5)	1 (4.5)	22	37.9	0.6
T. minimus	0 (0.0)	1 (5.0)	0 (0.0)	12 (60.0)	0 (0.0)	7 (35.0)	20	34.5	0.5
T. partitus	1 (8.3)	0 (0.0)	4 (33.3)	7 (58.3)	0 (0.0)	0 (0.0)	12	20.7	0.3
T. effilatus	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2	3.5	0.1
T. crassus	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	1	1.7	0.0
T. fusciventer	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1	1.7	0.0
Chrysops	**2 (10.5)**	**0 (0.0)**	**2 (10.5)**	**2 (10.5)**	**1 (5.3)**	**12 (63.2)**	**19**	**100.0**	**0.5**
C. fasciatus	0 (0.0)	0 (0.0)	0 (0.0)	1 (10.0)	0 (0.0)	9 (90.0)	10	52.6	0.3
C. dispar	2 (28.6)	0 (0.0)	2 (28.6)	1 (14.3)	0 (0.0)	2 (28.6)	7	36.8	0.2
C. fixissimus	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	1	5.3	0.0
C. fuscomarginalis	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	1	5.3	0.0
Haematopota javana	0 (0.0)	1 (33.3)	0 (0.0)	2 (66.7)	0 (0.0)	0 (0.0)	3	100	0.1
Haematobosca species	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	28 (96.6)	1 (3.4)	29	100.0	0.8
Haematobia exigua	1 (33.3)	0 (0.0)	2 (66.7)	0 (0.0)	0 (0.0)	0 (0.0)	3	100.0	0.1
Total	**246 (6.3)**	**803 (20.6)**	**365 (9.4)**	**1070 (27.5)**	**360 (9.3)**	**1045 (26.9)**	**3889**		**100.0**

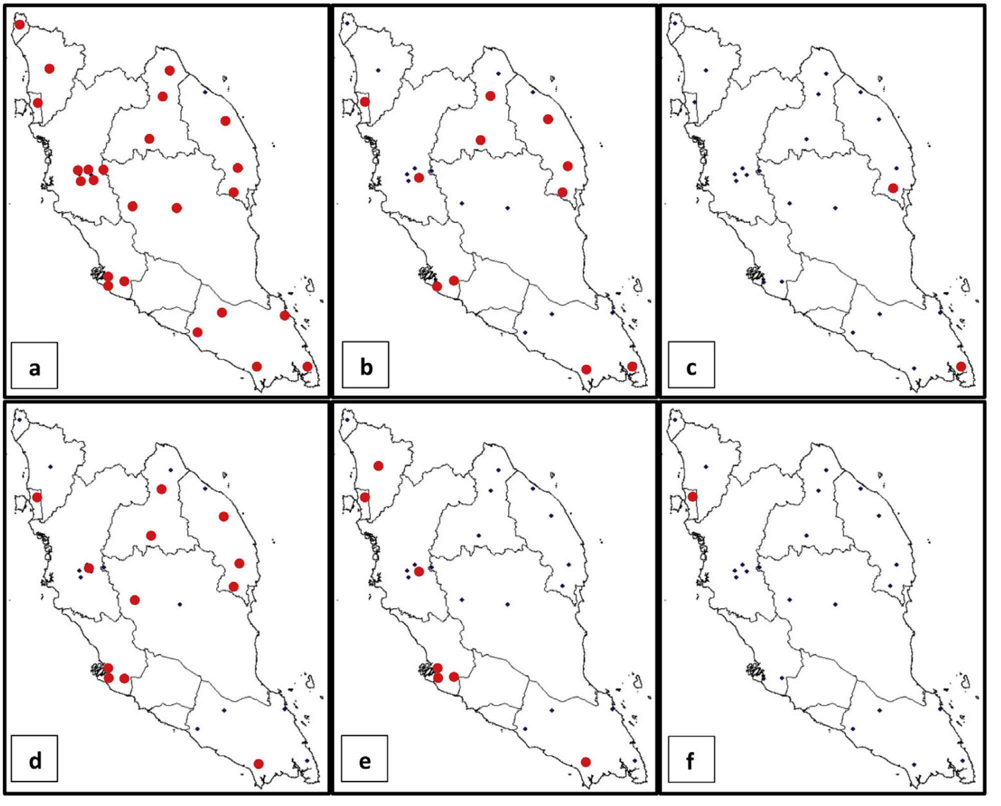

Fig. 1. Spatial distribution patterns of *Stomoxys* species on cattle farms in Peninsular Malaysia. Presence of a particular species on the sampled farms is indicated by a red filled circle. Black dots represent farms negative for the blood sucking arthropod. (a) *S. calcitrans*, (b) *S. indicus*, (c) *S. uruma*, (d) *S. pulla*, (e) *S. sistens*, (f) *S. bengalensis*. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

2. Experimental design, materials, and methods

2.1. Sampling locations

Haematophagous flies were trapped in 25 cattle farms across Peninsular Malaysia. The geographical coordinates are provided in the specification table. All the farms sampled had no record of using insecticides to protect cattle from biting insects. In order to have a well-structured distribution of the studied vectors, Peninsular Malaysia was divided into six arbitrary zones based on its geographic landscape.

2.2. Trapping and transportation of haematophagous flies

Two traps each of the Nzi, Malaise and the Intercept traps were deployed in all the 25 cattle farms for the purpose of collecting haematophagous flies. The Nzi trap is a triangular structure (110 cm height × 100 cm width) with an azure blue cloth at the entrance that serves to attract the flies. The Malaise trap (Townes-style) (BioQuip Products, USA) is a tent-like structure (176 cm height × 165 cm width × 180 cm depth) made of black and white Terylene netting material. The Intercept trap (BioQuip Products, USA) is a four-sided trap (110 cm height × 110 cm width) made of black and white terylene netting material stationed to intercept flies from all directions. For both the Malaise and Intercept traps, the contrasting black and white material serve as an attractant to the flies. Ventilated plastic collection

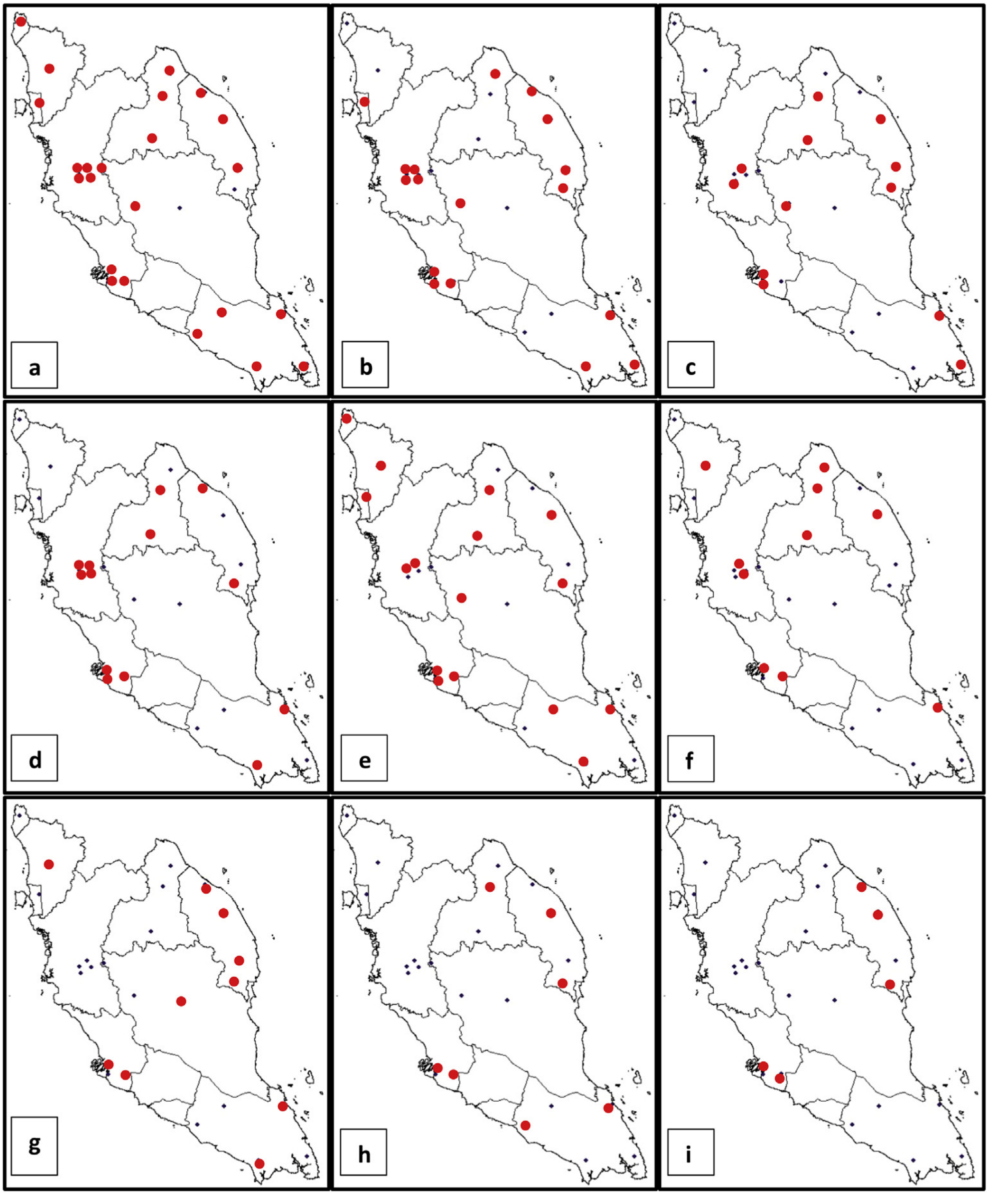

Fig. 2. Spatial distribution patterns of *Musca* species on cattle farms in Peninsular Malaysia. Presence of a particular species on the sampled farms is indicated by a red filled circle. Black dots represent farms negative for the blood sucking arthropod. (a) *M. crassirostris*, (b) *M. inferior*, (c) *M. conducens*, (d) *M. sorbens*, (e) *M. ventrosa*, (f) *M. bakeri*, (g) *M. planiceps*, (h) *M. asiatica*, (i) *M. formosana*. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

bottles at the apex of each trap served to contain the trapped flies. The fly traps were placed at a minimum of 10 m apart from each other. The Nzi, Malaise and Intercept traps (two each) were deployed on each farm from 7 am to 7 pm. This research was conducted from October 2013 to October 2014, with farms sampled on different days. The trapped biting flies were preserved in 95% ethanol and transported to the Parasitology Labouratory of the Faculty of Veterinary Medicine, Universiti Putra Malaysia for subsequent species identification by using a stereomicroscope.

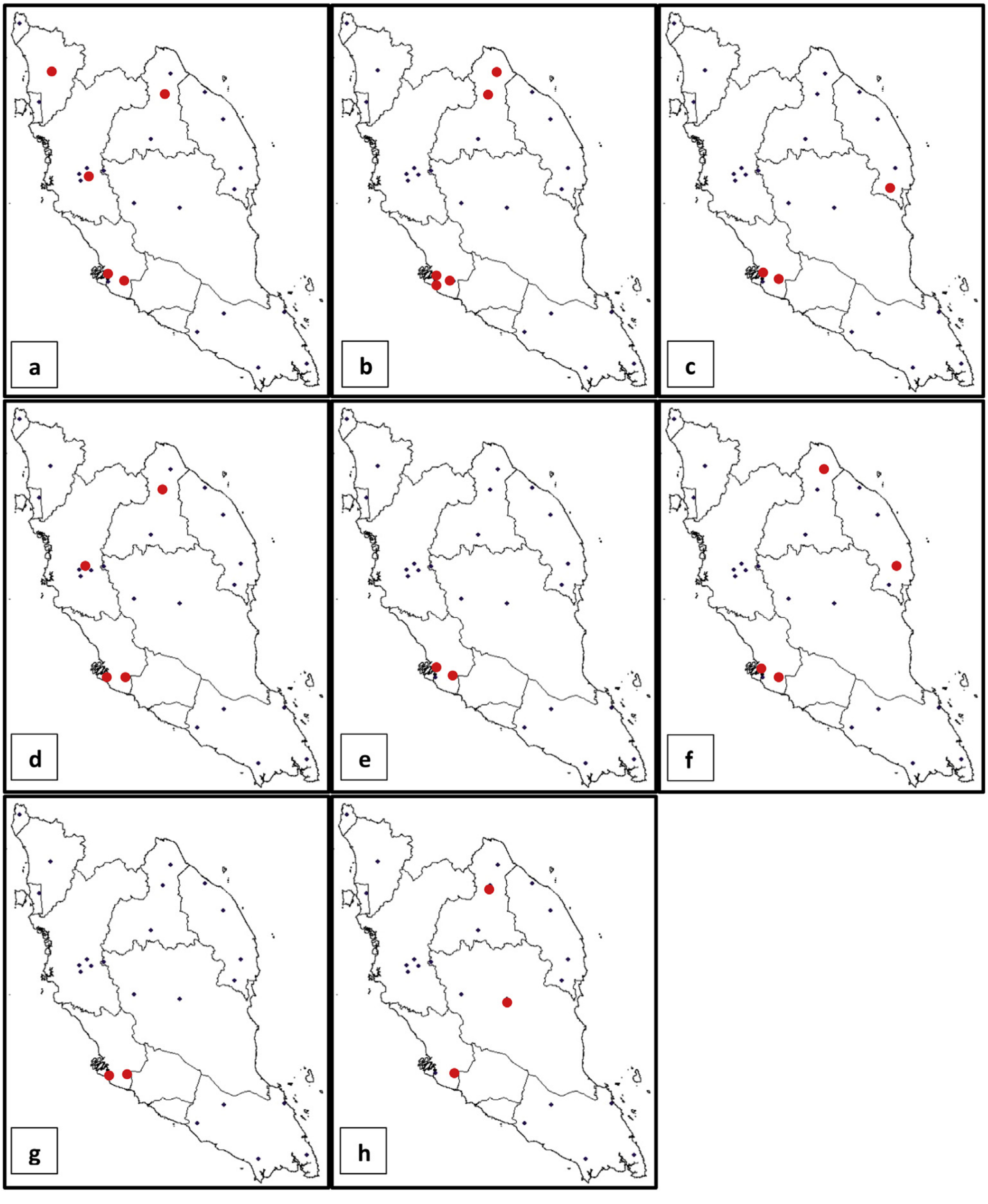

Fig. 3. Spatial distribution patterns of *Musca* species on cattle farms in Peninsular Malaysia. Presence of a particular species on the sampled farms is indicated by a red filled circle. Black dots represent farms negative for the blood sucking arthropod. (a) *M. senior whitei*, (b) *M. fletcheri*, (c) *M. craggy*, (d) *M. lucens*, (e) *M. pattoni*, (f) *M. convexifrons*, (g) *M. fasciatus*, (h) *M. bezzii*. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

2.3. Identification of haematophagous flies

Flies from the family Muscidae were identified using taxonomy keys by Magpayo et al. [1], Nihei and De Carvalho [2] and Tumrasvin and Shinonaga [3,4]. The *Tabanus* species were identified using taxonomy keys by Burger and Thompson [5], Burton [6], Philip [7,8] and Schuurmans [9]. Species of

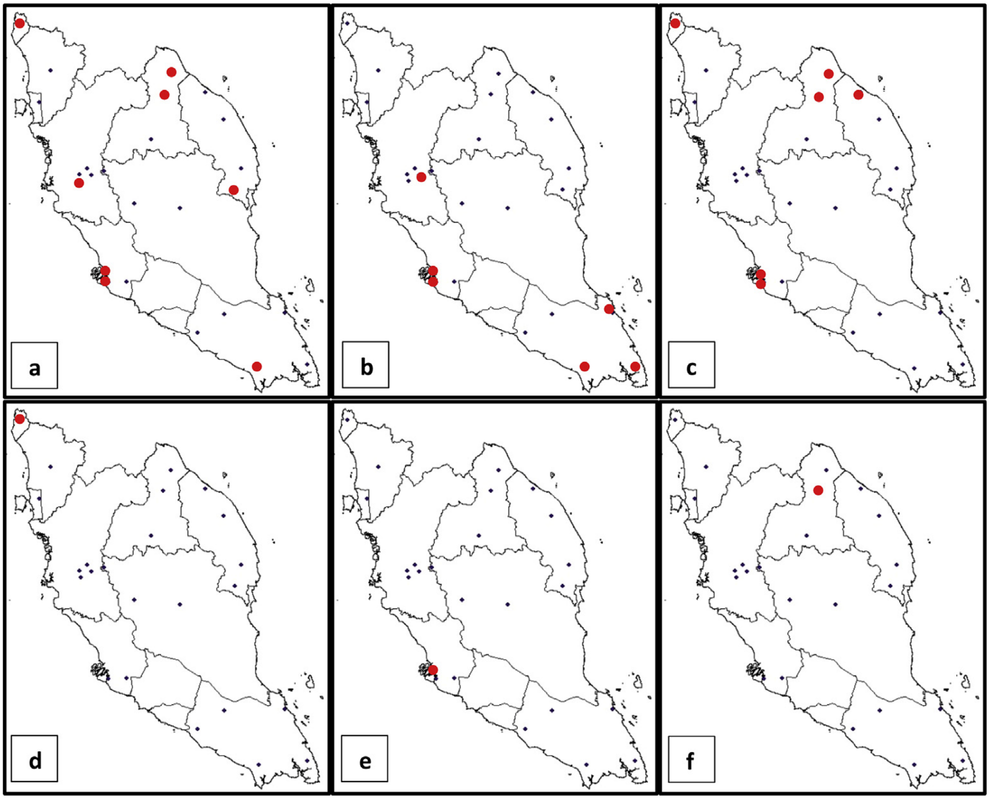

Fig. 4. Spatial distribution patterns of *Tabanus* species on cattle farms in Peninsular Malaysia. Presence of a particular species on the sampled farms is indicated by a red filled circle. Black dots represent farms negative for the blood sucking arthropod. (a) *T. rubidus*, (b) *T. minimus*, (c) *T. partitus*, (d) *T. effilatus*, (e) *T. crassus*, (f) *T. fusciventer.* (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

Chrysops were identified using taxonomy keys by Burger and Chainey [10], Philip [8] and Schuurmans [9], while *Haematopota* species were identified using keys by Schuurmans [9] and Stone and Philip [11].

2.4. Spatial and statistical analyses

The farm coordinates were loaded into a geo-database (ArcGIS 9.1TM, ESRI, Redlands, CA, USA) for mapping and spatial analysis of the distribution patterns of biting flies. Data was initially tabulated on Microsoft Excel 2010 and analyzed using the Statistical Package for Social Sciences version 22.0 (SPSS Inc., Chicago, IL, USA). One-way Analysis of Variance (ANOVA) was used to analyze the number of flies caught in relation to their geographic distribution (zones). The Least Significant Difference (LSD) was used as post hoc test after data were log transformed on haematophagous flies (catch + 1). Statistical significance levels were set at 5% ($p < 0.05$).

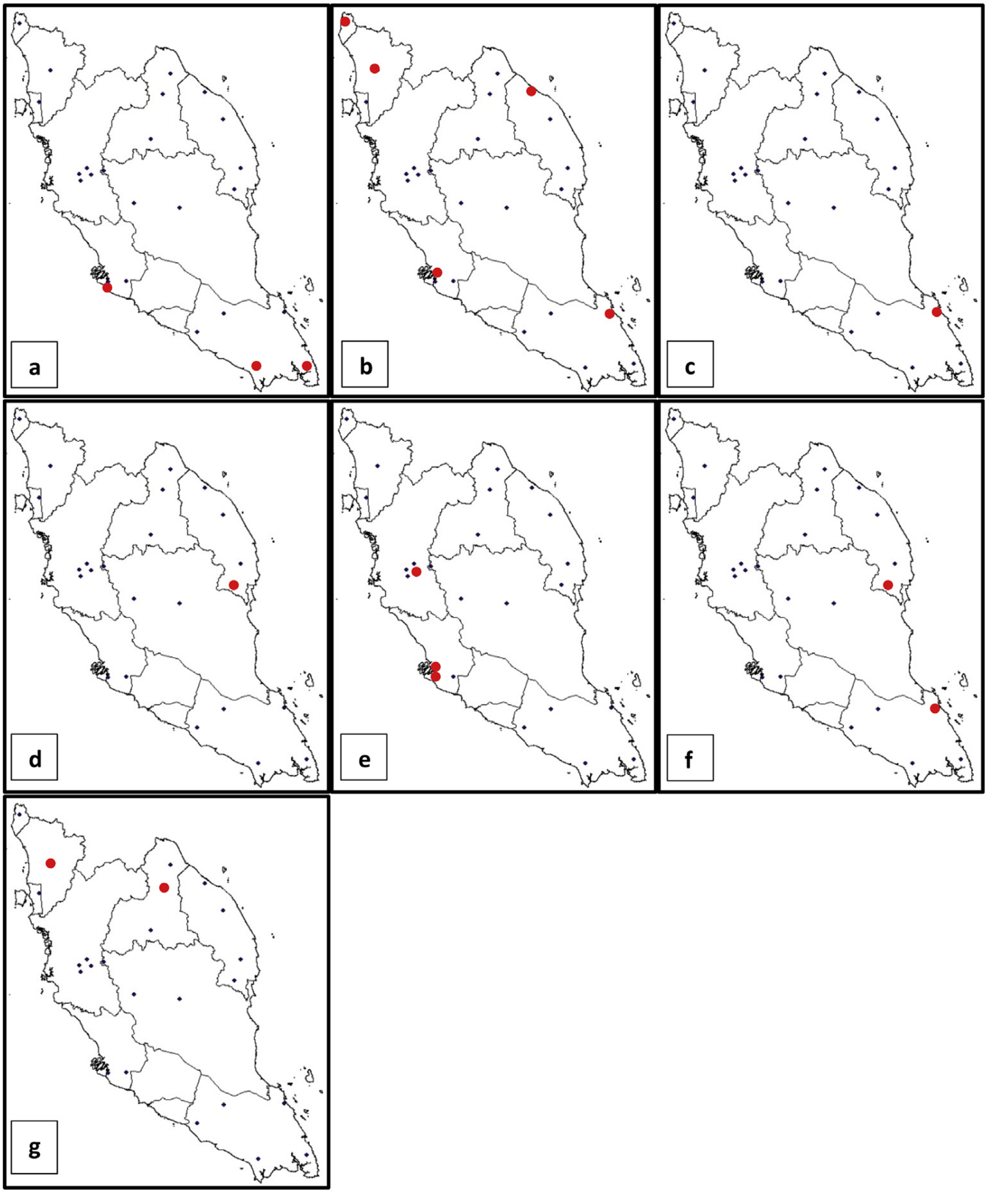

Fig. 5. Spatial distribution patterns of *Chrysops* species [(a) *C. fasciatus*, (b) *C. dispar*, (c) *C. fixissimus*, (d) *C. fuscomarginalis*] (e) *Haematopota javana*, (f) *Haematobosca* sp., (g) *Haematobia exigua* on cattle farms in Peninsular Malaysia. Presence of a particular species on the sampled farms is indicated by a red filled circle. Black dots represent farms negative for the blood sucking arthropod. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2020.105315.

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