

e-Proceedings

# INTERNATIONAL SYMPOSIUM ON INSECTS (ISoI 2014)

*"Insect: Harnessing the Power,  
Unlocking its Potential"*

1-3 December 2014  
Bayview Hotel Melaka  
Malaysia



*Co-organizer:*



**Centre for Insect Systematics**  
Faculty of Science and Technology, Universiti Kebangsaan Malaysia



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## Survey of Bed Bugs, *Cimex hemipterus* (Fabricius) Infestation in Malaysia

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### ABSTRACT

A few selected locations such as hotels, public accommodations, and residential premises located in several states in Malaysia were surveyed for bed bug infestations between October, 2013 and August, 2014. Only one species of bed bug was found, the tropical bed bug *Cimex hemipterus* (Fabricius). Infestations mostly occurred in residential houses and apartments. However, due to travelling activities, bed bug most likely infested low budget hotels and public accommodations such as airport. The percentage of infested sites within premises indicated that bedding area had the highest infestation with 69%, followed by walls and floors with 18%, sofa and cushion with 9% and wooden furniture with 4%.

Key words: *Cimex hemipterus*, tropical bed bug, infestation, survey, Malaysia

### INTRODUCTION

Three species of bed bugs associated with human blood which are common bed bug (*Cimex lectularius*), tropical bed bug (*Cimex hemipterus*) and bat bug (*Leptocimex boueti*) (Miller, 2008). Bat bug (*L. boueti*) feed on human blood as well as blood of birds and bats while the other two species (*Cimex lectularius* and *C. hemipterus*) rely most on human blood (Reindhart and Siva-Jothy, 2007). These three varies in some morphological features and geographical range. Bat bugs primarily feed off blood of bats but they may feed on human blood as well. In terms of appearance, they do look alike as the other two blood-suckers except that bat bugs species can only be found in West Africa (Cain, 2013). *Cimex hemipterus* become prevalent in tropical regions of Southeast Asia such as in Malaysia, Singapore, Vietnam, and Indonesia whereas *C. lectularius* favors much more temperate habitats and is widely distributed almost in all parts of the world (How and Lee, 2010). There are a few places that have both species such as in Chiangmai, Thailand (Suwannayod et al., 2010).

Bed bugs are usually found in bedrooms, but hide in cracks and crevices during the day times. The most common shelters for bed bugs are in the seams of mattresses, in crevices in the bed frame, headboards or inside walls (Cain, 2013; Jacobs, 2007; Khan and Rahman, 2012; Mcleod, 2005). Established infestation is associated with dark or black staining of the mattress from its excreta and an unpleasant smell secreted by the bugs. It is difficult to eradicate the bed bugs once they infested for they are small, thin, and can hide deep in narrow cracks (Harlan, 2006). More than 70 percent of bed bugs infestation occurs in hotels and motels, followed by college dorms, residential house and flats, school and daycare centers and many places but with lower percentage (Bliss, 2013).



The resurgence of bed bug infestations has gained worldwide attention, especially among pest management professionals. Available host for blood meal, plenty places to hide and harborage, and other conditions such as ambient temperature and relative humidity will facilitate their infestation and increase their number drastically (Harlan, 2006). This research study aimed to know the percentage of collected tropical bed bugs (*C. hemipterus*) in several locations in Malaysia as well as to study bed bugs infestation in different types of premises. Some residents are not aware of bed bugs and did not take notice as they travel to vary places. In this way, residents may enhance their knowledge and take care of their belongings from time to time.

## MATERIALS AND METHODS

Surveys were conducted in the selected regions in Penang, Kelantan, Terengganu, Pahang, Selangor and Kuala Lumpur. The areas that involved in this study include Gelugor, Bayan Lepas, Tanjung Bungah, Batu Feringgi, Sungai Nibong, Ayer Itam, Georgetown, Teluk Bahang, Seberang Perai Utara, Kota Bharu, Machang, Kuala Terengganu, Dungun, Kuantan, Cameron Highland, Petaling Jaya, Shah Alam and Kuala Lumpur International Airport (KLIA). Surveys were carried out between October, 2013 -August, 2014. The target locations in the survey were mainly in residential houses, flats and apartments, as well as public places such as airport.

Infested locations within premises were classified into five categories: (1) bedding (pillow, mattress, bed frame, bed sheet, and mosquito net); (2) headboard; (3) walls and floors (including cracks and crevices); (4) seats (sofa and cushion); and (5) wooden furniture (How and Lee, 2010). A thorough visual inspection was conducted using flashlights, soft forceps and brushes. Infestations were identified if there are presences of blood fecal spots, shed exoskeletons, empty egg cases, live or dead bed bugs (Harlan, 2006; How and Lee, 2010). Bed bugs were kept in sample bottle with folded paper as their harborage and brought back to the laboratory for identification. Pictures during inspection and collection of insect were taken using digital camera (Olympus VH-510, Olympus Imaging Corporation, Tokyo, Japan). The result of survey was analyzed using percentage of collected insects based on each surveyed area and percentage of infested sites according to their harborage site.

## RESULTS AND DISCUSSION

Only a species of bed bug, the tropical bed bug *C. hemipterus* (Fabricius), was found at positive surveyed sites. Frequency of collected bed bugs according to areas and location were concluded in percentage values. For instance, Gelugor recorded the highest number of collected bed bugs with 34% while the lowest was Dungun with only 1% of bed bugs collected. Seberang Perai also had high number of collected bed bugs with 18% followed by Petaling Jaya with 13%, and Kuala Terengganu with 10%. Kuantan and KLIA recorded 7% and 6% of collected *C. hemipterus* respectively. Meanwhile, the following areas recorded low number of strains with 4% in Bayan Lepas, 3% in Tanjung Bungah, 2% in Batu Feringgi and 2% in Cameron Highlands (Figure 1). The percentage of infested sites within premises indicated that bedding area had the highest infestation with 69%, followed by walls and floors with 18%, sofa and cushion being minimally infested with 9% and wooden furniture were less infested with 4% (Figure 2).

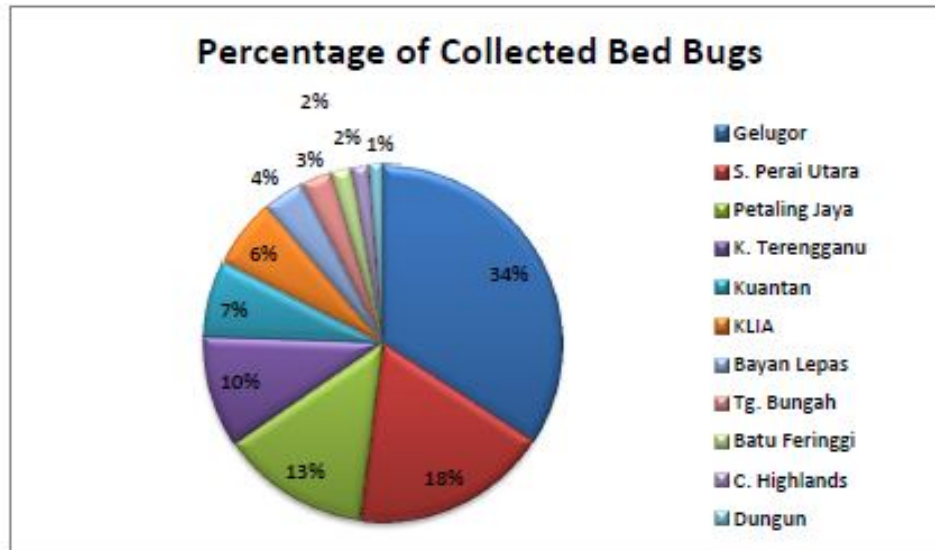


Figure 1: Percentage of collected bed bugs by each surveyed area.

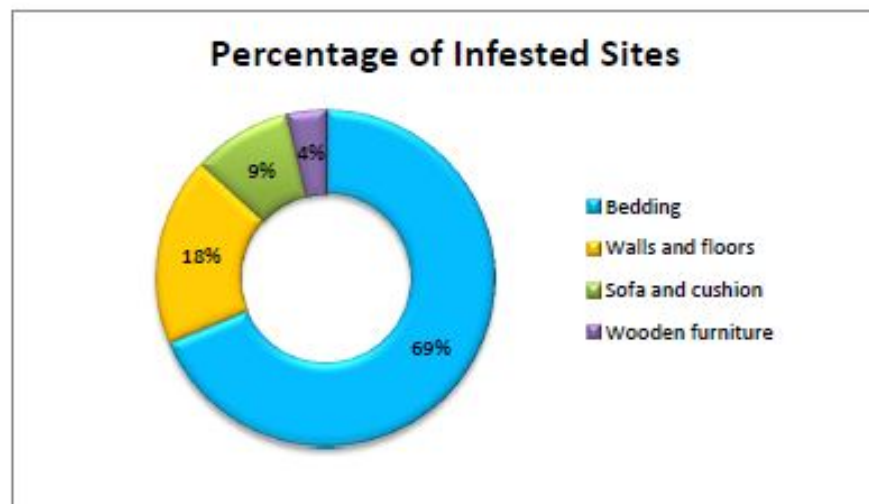


Figure 2: Percentage of infested sites according to their harborage sites.

*Cimex hemipterus* is prevalent in the tropic regions, according to previous studies (How and Lee, 2010; Pinto *et al.*, 2007; Tawatsin *et al.*, 2013) unlike *Cimex lectularius*, which is most common in the temperate regions (Hwang *et al.*, 2005). High percentage of this species in the areas of Pulau Pinang reported that the state also had serious bed bug infestations issue as most of the surveyed sites showed positive results. Low understanding level and less care behavior among the inhabitants had spread out the bugs to other areas.



Infestations mostly occurred in residential houses and apartments compared to public places such as bus station and airport (Wang *et al.*, 2013). However, reports stated that bed bugs are most likely infested low budget hotels and motels (Tawatsin *et al.*, 2013; Wang *et al.*, 2009) due to international migration of citizens which causes the infestation rates went up drastically. Factor such as social migration refer to travelling activities throughout the world of the locals and foreigners either on business trips or vacations which accidentally brought along this tiny insect in their belongings (Hwang *et al.*, 2005). This may be the key factor that contributed to the infestation in KLIA since airport is the main entrance for migration of citizens and foreigners, the pests may harbor in the belongings which later infest the waiting area in the airport, commonly underneath cushion seats (Boase, 2008).

Sanitation or cluttering level is not actually the real cause to high infestation of bed bugs in the premises. Since the results showed that even though the sanitation level in the house or apartment is medium or high but there were cases of bed bugs infestation. Sanitation, in other words, is a non-chemical control method that should be practiced all the time to avoid unwanted things or creatures in the living spaces. This will ensure that they are free from insect pest thus avoiding outbreak of the pests in a new environment. As bed bugs mainly survive on hosts' blood, therefore cleanliness is not a major contributor to an established infestation (Omudu *et al.*, 2010). However, there are possibilities that will reduce their hiding spots such as eliminating clutter, repairing cracks and crevices, and cleaning up accumulated debris and dirt (Harlan, 2006).

In Pulau Pinang, Gelugor showed the highest infestation based on collected insects. Abundance of rental houses and apartments in Gelugor probably increased the infestation rate of bed bugs. Changing of tenants throughout a period could be a factor for the pests to survive long enough until few generations especially when the owners do not care about controlling the insects (Omudu *et al.*, 2010). In terms of harborage sites, more than 50% of infestations reported to be around the bedding area. Naturally, bed bugs prefer living in an enclosed and dark environment yet near to their food source which makes bedding area to be the most suitable site to harbor as well as reproduce eggs (Kaufmann *et al.*, 2006). Crevices along the walls and floors are the main reproduction site and place to harbor for the insect. Sofa and cushion provided comfort surfaces to bed bugs due to warm temperature whereas wooden furniture had the least percentage (4%) as they have no places to hide unless porous surfaces or cracks are found on the surface of the furniture (Wang *et al.*, 2009).

## CONCLUSION

Bed bugs issues may increase due to the dispersal of bed bugs as they traveled or accidentally transported on clothes, luggage, and furniture. Most infestation problems were reported from houses and apartments and the bugs can be found around bedding area, edges of sofa and cushion, cracks and crevices on walls and floors. There were no interaction between cluttering level and number of bed bugs population as they only survive depending on their basic necessities such as blood and warm temperature. As such, encasing luggage in hotels while travelling and inspecting rented houses for infestation signs can reduce the probability of transporting bed bugs and infestation. Thus, this approach can reduce and prevent from any bed bugs bites.



## ACKNOWLEDGEMENTS

The authors would like to thank Universiti Sains Malaysia for funding the research (Short Term Grant: 304/PBIOLOGI/6313030). Our appreciation is extended to the pest control and management companies for assistance in the survey. We also thank the residents who allowed us to collect bed bugs sample at their houses.

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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

e-Proceedings International Symposium on Insects (ISoI 2014)

Editors Muzamil Mustaffa... (et al.)

ISBN 978-967-0829-08-1

1. e-Proceedings. 2. International Symposium on Insects (ISoI 2014).

The views, opinions and technical recommendations expressed by the contributors and authors are entirely their own and do not necessarily reflect the views of the editors, reviewers, society, centre, faculty or the university.

Cover design: Salmah Yaakop

Typesetting: Muzamil Mustaffa

Typeface: Times New Roman

Typesize: 14/12

Printed in Malaysia by: Eworks Creative Enterprise

No. 4A Kedai PLB Teras Jernang,

Jalan P1A, 43650, Bandar Baru Bangi,

Selangor Darul Ehsan.

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