The Mapping of Spatial Distribution of Selected Hemipteran (Phyyhocoridae and Coreidae) at Universiti Teknologi MARA Pahang

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ABSTRACT

This paper discusses the mapping of spatial distribution of Dysdercus spp. (Phyyhocoridae) and Anoplocnemis spp. (Coreidae) at Universiti Teknologi MARA (UiTM) Pahang, Jengka Campus plantation area by using Global Positioning System (GPS) and Geographical Information System (GIS). The main objectives are to collect and create a database of insect pest, to determine spatial distribution and predict behavioural pattern of the species above. The sampling was done every 2 days for a period of 30 days. The work was carried out by three men-day. The sampling technique used was by using the insect sweeping net and through direct observation. The coordinate system in terms of longitude and latitude (WGS 84) were recorded by using Garmin eTrex Summit (GPS receiver) for each Dysdercus spp. and Anoplocnemis spp. discovered. At total of 91 individuals of Anoplocnemis spp. and 6 individuals of Dysdercus spp. were recorded during the field study. The data were then associated with the GIS application in order to map the spatial distribution of the insect pests. In conclusion, the combination of database, GPS and GIS provides an excellent tool for predicting and monitoring the behavioural patterns of insect pests especially in a large area.

Keywords: *Global Positioning System, Geographical Information System, Hemiptera, Dysdercus spp., Anoplocnemis spp.*

Introduction

GPS applications are extensive. These include navigation, surveying, timing and communication, exploration, transportation management, structural monitoring, conservation strategy and various types of automation (Hoffman-Wellenhof et al. 1992; Muzamil et al. 2000). By using a GPS receiver, one can determine certain locations with a great precision. The GIS is an organised collection of computer hardware and software designed to create, manipulate, analyse, and display efficiently all types of geographically or spatially referenced data (Anon. 2001).

Dysdercus spp. (kepinding bendi), a Phyyhocoridae bug is commonly found in Malaysia. It can be identified by the basal half of the forewing is of a dull red colour with a black spot, and the other half is membranous and black (Ahmad & Balasubramaniam 1981; Jamaludin et al. 1999; Yusof & Khoo 1989). *Anoplocnemis* spp. (pianggang, kepinding or kesing), a Coreidae bug can be identified by the basal half of the forewing is thicken, and the other half is membranous and black (hemelytron); the femora is big (Mohamed Salleh 1983). Phyyhocoridae bugs and Coreidae bugs are economically important pests. These groups of insect bring damage to agricultural crops by feeding on cell saps, causing oviposition damage, and serving as vectors of several plant diseases organisms particularly viruses.

Universiti Teknologi MARA (UiTM) Pahang is built on an area of 1,000 acres (Figure 1) encompassing the institution buildings, forest reserve and farm (23, 100, 200 acres plots). The 200 acres of the farm plot are planted with oil palm and rubber trees; 100 acres of the farm plot have several types of fruit crops (manggis, jambu air madu, durian belanda, nangka, cempedak, rambutan, limau madu, limau barli, ciku, mangga, jambu, belimbing, sukun and duku langsat) and the other 23 acres of the farm plot consist of a nursery, herbal, botanical garden and sharefarm. Several studies on mapping of selected species at UiTM Pahang have been carried out such as *Valanga nigricornis* (Muzamil and Sarina 2002) and *Shorea* spp. (Muzamil et al. 2002) and also insect pest diversity at sharefarm (Muzamil 2002).

The main objective of this study is to collect the Phyyhocoridae bug and Coreidae bug data and to create a database of these insect pests. The data were then associated with the GIS application in order to get the spatial distribution and predict behavioural pattern of these insect pests at UiTM Pahang plantation area. The database and spatial distribution are very helpful and will facilitate the Unit Ladang (Plantation Unit) of UiTM Pahang to manage and control the insect pests.

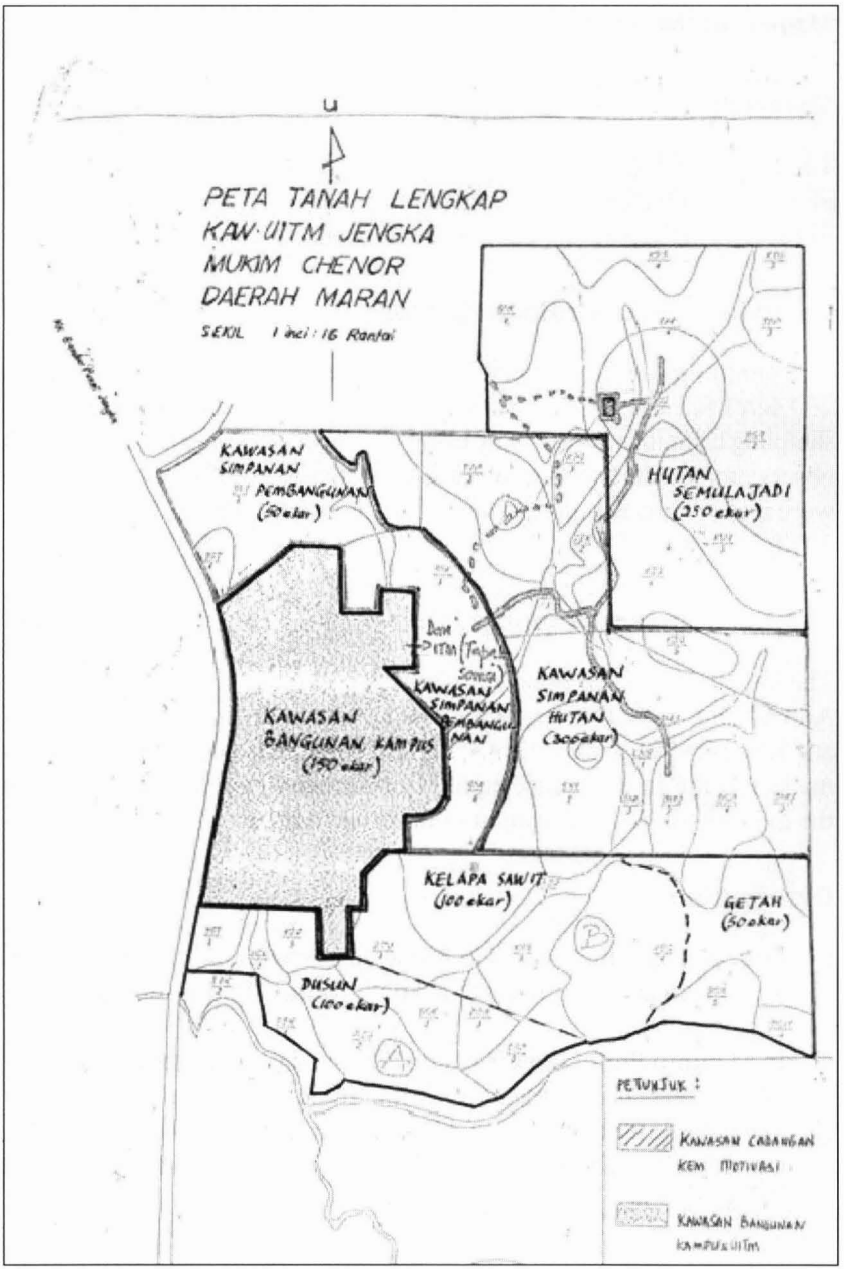


Figure 1: Map of UiTM Pahang, Jengka Campus

Materials and Methods

Materials

The specimens that had been observed and caught in this study were identified as *Dysdercus* spp. (kepinding bendi), a Phyyhocoridae bug and *Anoplocnemis* spp. (pianggang, kepinding and kesing), a Coreidae bug.

Sampling and Coordinate System

The sampling was done every 2 days for a period of 30 days at 23, 100, 200 acres farm plots. The work was carried out by three men-day. The sampling technique used was by using the insect sweeping net and through observation randomly. The coordinates, longitude and latitude (WGS 84) were retrieved by using a Garmin eTrex Summit (GPS Receiver) (Anon. 2000).

Identification and Assumption

The identification was done based on the previous studies carried out by Ahmad and Balasubramaniam (1981), Jamaludin et al. (1999), Yusof and Khoo (1989), and Mohamed Salleh (1983). An assumption had been made that the individuals caught or observed would be different from the individuals that was caught or observed earlier.

Distribution

i. Data and coordinates (WGS 84) were keyed-in in File MakerPro 5. The data were exported into a ".dbf" format. Export-dbf-move all-OK.
ii. In MapInfo Professional version 7.5, the data were retrieved. Open table; Create point, select file-X longitude-Y latitude-OK;
iii. The data are associated with ADC WorldMap version 4, vol. 4 (Asia). Open workspace D:\Asiawm4; Map, layer control-add layer select file name-OK.

Results and Discussion

Table 1 shows the number of insect pests recorded in the study area. A total of 91 individuals of *Anoplocnemis* spp. and 6 individuals of

Dysdercus spp. were observed and caught during the field study. The highest number of individuals of Anoplocn*emis* spp., which is 34 individuals, recorded at 100 acres farm plot. Only three individuals of *Dysdercus* spp. recorded at 100 acres and 200 acres farm plots. The highest percentage/acre of *Anoplocnemis* spp. and *Dysdercus* spp. are 1.39 at 23 acres farm plot and 0.03 at 100 acres farm plot, respectively.

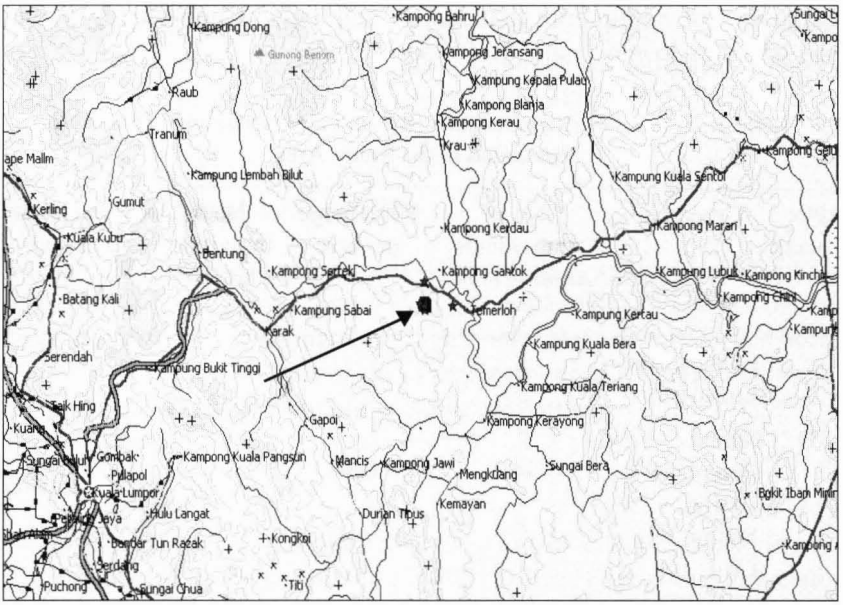
Several observations and results from this study indicated that plot sizes is not appropriate to predict the species richness of *Anoplocnemis* spp. in UiTM Pahang. However, the variety of crops present in certain area is of very great importance and meaningful. 23 acres farm plot planted with various types of crops and vegetables were compared to 100 and 200 acres farm plots. This finding is consistent with the feeding behaviour of hemipteran that fed on cell saps of non-woody plants suggested by Romoser and Stoffolano (1998).

Table 1: Number of *Anoplocnemis* spp. and *Dysdercus* spp. That Were Recorded in the Study Area

Plot (acre)	Crop/area	No. of individuals *Anoplocnemis* spp.	Percentage per acre	No. of individuals *Dysdercus* spp.	Percentage per acre
	Limau madu	1		-	
	Limau barli	8		-	
100	Jambu	2		-	
	Belimbing	14	0.34	3	0.03
	Durian	-		-	
	Sukun	5		-	
	Ciku	4		-	
23	Nursery	2		-	
	Botanical garden	9	1.39	-	-
	Sharefarm	21		-	
200	Rubber and	25	0.125	3	0.015
	Oil palm	-		-	
	TOTAL	91		6	

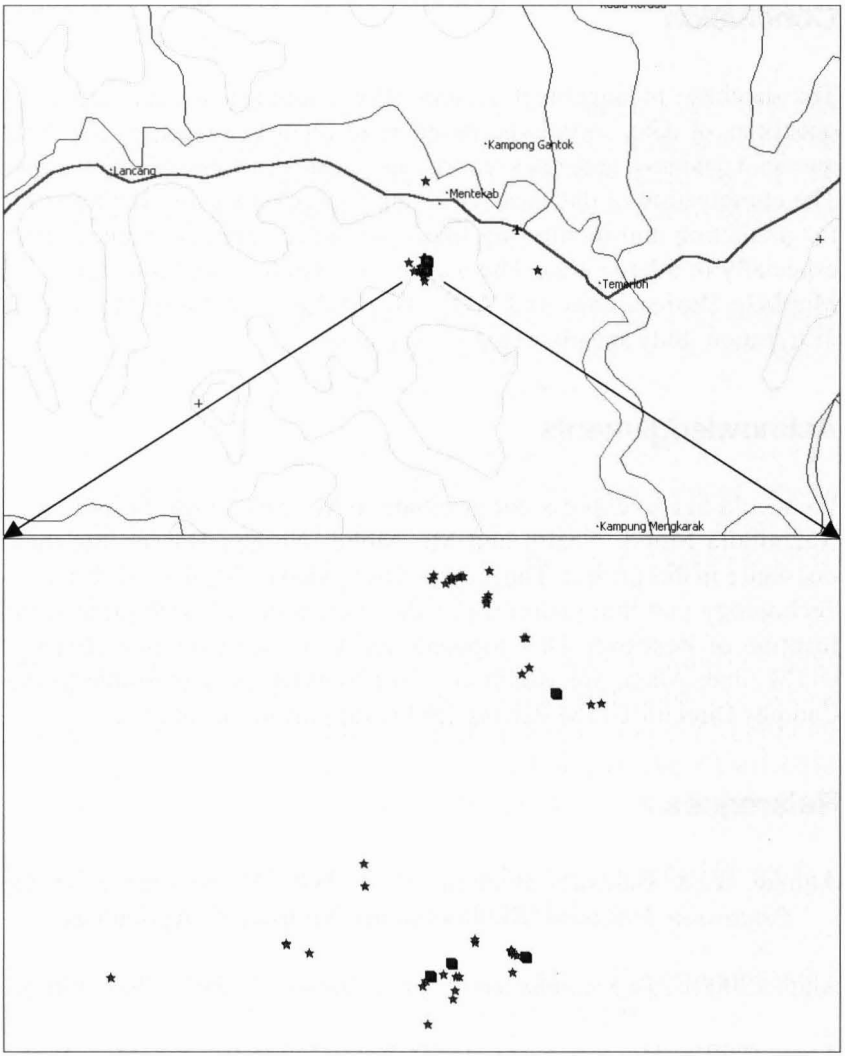
For *Dysdercus* spp., no distinct pattern can be discussed because of the small number of individuals that were found in study area. Further study should be conducted on *Dysdercus* spp. in UiTM Pahang.

Using the data collected from the field study, GIS applications was used to get spatial distribution of *Dysdercus* spp. and *Anoplocnemis* spp. at UiTM Pahang as shown in Figure 2 (unzoom) and Figure 3 (zoom). This study concluded that GIS provides the analysis of data sets and supports a relational database of tabular information relating to areas and points on the maps. Using the database, the researchers or estate manager can get the location of the particular insect pests easily in order to manage and control them.



1 cm: 50 km

Figure 2: Distribution of *Dysdercus* spp. and *Anoplocnemis* spp. in UiTM Pahang (unzoom)



1 cm: 400 m

Anoplocnemis spp.
Dysdercus spp.

Figure 3: Distribution of *Dysdercus* spp. and *Anoplocnemis* spp. in UiTM Pahang (zoom)

Conclusion

The database management system allows quick and easy access to quantities of data, sorts large numbers of records, organises the data, queries a database, generates reports, and creates customised application. The combination of database, GPS and GIS provides an excellent tool for predicting and monitoring the behavioural patterns of insect pest especially in a large area. The used of the database and integration of MapInfo Professional and ADC WorldMap will facilitate spatial distribution study and plant protection planning.

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