UNIVERSITI PUTRA MALAYSIA

FORAGING ACTIVITIES OF *APIS CERANA* IN A COCONUT PLANTATION

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FORAGING ACTIVITIES OF *APIS CERANA* IN A COCONUT PLANTATION

By

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FORAGING ACTIVITIES OF *APIS CERANA* IN A COCONUT PLANTATION

by

MAI SHIHAH BINTI HAJI ABDULLAH

NOVEMBER 1990

Supervisor: Assocciate Prof. Dr. H.M. Ruth Kiew
Faculty : Science and Environmental Studies

Honey production of *Apis cerana* has been limited for a long time by outdated management methods and the lack of knowledge of bee behaviour. A great variety of plants are found in Malaysia and many flower throughout the year. Particularly important in beekeeping are the two major nectar flow periods that occur in February and August-September. This study is based on observation of foraging by three colonies of *Apis cerana* in a coconut plantation at Tanjung Karang, Selangor Darul Ehsan, Peninsular Malaysia from March 1988 until March 1989. The major nectar sources were coconut, *Cocos nucifera* (Palmae) and the weed, *Asystasia intrusa* (Acanthaceae). While *A. intrusa* flowers throughout the year, coconut shows marked peaks of flowering from February to June and August to September with a dearth period in December to

January. Major pollen sources included coconut, maize *Zea mays* (Gramineae) and to a lesser extent species of Compositae. The workers actively commence foraging activities from 0700 h until 1930 h. Climatic factors did not appear to affect foraging activity, except for rainstorms which caused foraging to cease. This was one of the causes for reduced foraging in November to December, the monsoon period. In January and June the *Apis cerana* colonies had a population size of between 7,000 to 9,000 and reached 16,000-20,000 within 5-6 months. Colonies were monitored for number of brood, pollen and honey cells. Colony growth showed two cycles a year, one beginning in January, the other in June. At first, the number of brood cells increased and pollen foraging was particularly active. Buildup in population size coincided with the major nectar flow seasons resulting in honey accumulation. At the end of the nectar flow season, the colonies had reached optimum size and swarming occurred. The afterswarm was then susceptible to wax moth attack by *Galleria mellonella* particularly in November to December, the rainy season. Pests of *Apis cerana* include wasps *Vespa tropica*, red ants *Oecophylla smaragdina*, wax moth, and mites *Varroa jacobsoni*. Many colony losses were due to wax moth infestation, which can be controlled by good management

practices. Mites did not cause devastating damage compared with red ant attack, which resulted in rapid absconding. In coconut plantations, shortage of bee forage does not appear to be a problem at present stocking rates. Throughout the study, no supplementary food was given to the colonies, yet the colonies expanded their population tremendously. As maize is preferred pollen source, it is recommended to be planted close to the hives throughout the year.

Abstrak tesis yang dikemukakan kepada Senat Universiti Pertanian Malaysia untuk memenuhi keperluan untuk memperolehi Ijazah Master Sains.

AKTIVITI MENCARI MAKAN *APIS CERANA* DI KAWASAN TANAMAN KELAPA

Oleh

MAI SHIHAH BINTI HAJI ABDULLAH

NOVEMBER 1990

Penyelia : Profesor Madya Dr. H.M. Ruth Kiew
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Pengeluaran madu lebah yang terhad di Malaysia adalah disebabkan oleh kaedah pengurusan yang ketinggalan di samping kurangnya pengetahuan ke atas perlakuan lebah. Di Malaysia, terdapat variasi tumbuhan yang tinggi yang kebanyakannya berbunga sepanjang tahun. Terdapat dua aliran nektar yang utama di bulan Februari dan Ogos-September. Kajian ini dijalankan berdasarkan pemerhatian ke atas perlakuan mencari makan tiga koloni *Apis cerana* di kebun kelapa Tanjung Karang, Selangor Darul Ehsan, Malaysia dari Mac 1988 sehingga Mac 1989. Penyumbang nektar yang utama ialah kelapa, *Cocos nucifera* (Palmae) dan rumpai *Asystasia intrusa* (Acanthaceae). *A. intrusa* berbunga sepanjang tahun, manakala kelapa menunjukkan terdapatnya dua kemuncak aliran nektarnya pada Februari-Jun dan Ogos-September sementara tumbuhan ini rendah

aliran nektarnya pada Disember-Januari. Penyumbang debunga utama termasuklah kelapa, jagung *Zea mays* (Gramineae) dan yang kurang penting spesies dari keluarga Compositae. Pekerja-pekerja secara aktif memulakan aktiviti mencari makan dari jam 0700 hingga 1930. Faktor-faktor cuaca tidak mempengaruhi aktiviti mencari makan yang rendah kecuali ribut dan petir menyebabkan terhentinya aktiviti ini. Ini merupakan alasan mengapa kurangnya aktiviti mencari makan di bulan November-Disember semasa musim tengkujuh. Koloni *Apis cerana* mempunyai saiz populasi di antara 7,000-9,000 dan mencapai 16,000-20,000 dalam tempoh 5-6 bulan. Koloni diperiksa untuk menentukan bilangan anak, sel-sel debunga dan sel-sel madu. Pertumbuhan koloni menunjukkan terdapat dua kitaran setahun. Satunya bermula dalam bulan Januari, manakala yang satu lagi pada bulan Jun. Pemerhatian menunjukkan peningkatan bilangan anak dan aktiviti pencari makan debunga selari dengan pengeluaran nektar yang seterusnya ini meningkatnya pengumpulan madu. Pada akhir musim aliran nektar, saiz populasi menjadi optimum dan pemecahan koloni terjadi. Lebah-lebah yang tertinggal setelah pemecahan koloni terdedah kepada serangan ulat lilin *Galleria mellonella* terutamanya di bulan November-Disember semasa musim hujan. Musuh-musuh *Apis cerana* termasuklah

tebuan *Vespa tropica*, kerengga *Oecophylla smaragdina*, ulat lilin dan kutu *Varroa jacobsoni*. Kehilangan koloni kebanyakannya disebabkan oleh serangan ulat lilin yang boleh dikawal sekiranya koloni diurus dengan baik. Didapati kutu tidak mengakibatkan kerosakan yang besar jika dibandingkan dengan serangan kerengga yang mengakibatkan koloni meninggalkan haif. Di kebun kelapa, masalah kekurangan makanan tidak berlaku dengan kaedah penempatan haif yang ada sekarang. Sepanjang kajian ini dijalankan tidak ada makanan tambahan diberikan tetapi saiz populasi berkembang dengan baik. Jagung, merupakan penyumbang debunga yang baik dan dicadangkan untuk ditanam berhampiran dengan haif sepanjang tahun.

CHAPTER 1

INTRODUCTION

Background of the Study

The "Eastern Honeybee" (Butler, 1954) *Apis cerana*, which occurs east of Iran, is the equivalent of its occidental sister species *mellifera*. However, while *A. mellifera* has been kept commercially for several centuries and has been the subject of intensive research, *A. cerana* remains poorly known. In Malaysia beekeeping with *A. cerana* has only seriously developed in the last six years and even basic knowledge of its biology and behaviour is lacking.

The Development of Beekeeping in Malaysia

Beekeeping is a traditional side-line occupation in Malaysia's rural areas. Promotion through research and development by the Malaysian Beekeeping Research and Development Team (MBRDT) since 1983 has led to a tremendous increase in beekeeping. In 1986, there were 423 beekeepers in Peninsular Malaysia keeping a total of 4,353

hives. In 1987 this had increased to 694 beekeepers with 4,938 hives (Table 1). Beekeeping is popular partly due to the small investment required in terms of capital and time.

The operation and labour scale is flexible. Even the landless can keep bees. Futhermore, *A. cerana* is an efficient forager, and so has potential as a pollinator which can increase crop yields. For example, farmers report that the presence of bees increases the yield of starfruit (Phoon, 1984), cashewnut (Mohamad Muid and Makhdzir Mardan, 1985) and coconuts (Kiew and Mohamad Muid, 1989).

Table 1: Estimates of Beekeepers in Peninsular Malaysia 1986-1987

State	No. of Beekeepers		No. of Colonies	
	'86	'87	'86	'87
Perlis	6	12	7	36
Kedah	21	60	55	88
Pulau Pinang	1	20	9	89
Perak	28	20	356	682
Selangor	97	9	1170	1173
Negeri Sembilan	15	10	40	12
Melaka	1	108	390	480
Johor	143	142	2192	2179
Pahang	-	1	-	10
Terengganu	5	5	114	169
Kelantan	1	1	20	20
Total	423	694	4353	4938

Source: 1986 and 1987 Survey by Department of Agriculture Extension Agents