OCCURRENCE OF INDIGENOUS HONEYBEE SPECIES AND THEIR DISTRIBUTION IN TWO TOWNSHIPS, MAGWAY REGION

Cherry Soe[1], Thida Wai[2], Lai Lai Phyu[3], Nyo Nyo Lwin[4], Aye Mya Phyu[5]

Abstract

A total of four indigenous species from Magway University Campus in Magway Township and Yae Poke village in (Minbu/ Saku) Township, Magway Region were recorded during the period from June 2019 to January 2020. Three species of honeybees *Apis florea*, *A. dorsata*, *A. cerana* and one species of stingless bee, *Trigona iridipennis* were collected during the study period. Of those species *Apis cerana* was not found in Magway University Campus. All four species were recorded from Yae Poke village. A total of 123 honeybee nests were recorded from two study sites. Among them *A. florea* nest was recorded as the highest number and *A. cerana* nest was found the lowest number in the study period. In the present study, *A. florea* was found the most widespread indigenous honeybee species distribute in Magway region.

Keywords: Indigenous honeybee species, Honeybee nest, Stingless bee

Introduction

Honeybees are known to be the fascinating creatures and greatest friend of man. The bees are eusocial creatures and taught us how we should live and cooperate with each other in the society. People admire honeybees for their diligence, unity, sacrifice, tolerance, cooperation, coordination, division of labour, social service and usefulness (Agarwal, M.L. and Singh, R. 2018). There are about 25000 species of bees found in the world. They include honeybees, bumble bees, stingless bees, and solitary bees. Bees are the most efficient and most important pollinators of many cultivated crops and wild flora. A large number of bees on a crop ensure of good pollination that results in higher yields and better quality produce (Hepburn and Radloff, 2011).

Honeybees live in colonies where the young are nursed and fed by adults with a mixture of honey and pollen throughout the year. Honeybee colonies are large compared to other bees consisting of 5,000-80,000 individuals depending upon the species. Honeybees start their foraging early in the morning and cease late in the evening, working many hours a day. Honeybees have evolved a special communication system by which thousands of foragers can be deployed when a good food source is present. Most importantly, honeybees provide honey, beeswax and other bee products. They are found in different geographical areas and are adapted to different altitudes and climates (Free, 1993).

Nine species of honeybees, including the giant honeybees or rock bees (*Apis drosata* and *A. laboriosa*), the little honeybee (*A. florea*), the small dark honeybees (*A. andreniformis*), the Asian honeybee (*A. cerana*) and European honeybee (*A. mellifera*), are found in Asia (Hepburn, 2011). In Myanmar, the five indigenous honeybee species are *A. dorsata* (Giant Asain honeybee), *A. laboriosa* (Rock honeybee), *A. cerana (*Asian hive honeybee/Cavity nesting honeybee*), A. florea* (Little honeybee) *A. andreniformis* (Dwarf honeybee), and one exotic species is *A. mellifera* (European honeybee) (Petersen,2005).

A. *dorsata* is found throughout the Asian region up to 2,000m. It builds single comb nest in the open on branch of tall trees and tall buildings and chimneys, in shady places during summer

[1] Assistant Lecturer, Department of Zoology, Magway University
[2] Lecturer, Department of Zoology, Magway University
[3] Lecturer, Department of Zoology, Magway University
[4] Professor Head, Department of Biology, Yangon University of Education
[5] Lecturer, Department of Zoology, University of Yangon

and sunny places during winner. *A. dorsata* produce harvestable amounts of honey and is an important pollinator of many crops and other plants (Hepburn,2011). *A.florea* is one smallest honeybee species is called the dwarf bee. It also builds single comb nests on branches of bushes, hedges, small trees and chimneys, etc. This species is found in the plains and in hilly areas up to 500m, *A. florea* is another pollinator of agricultural crops (Hepburn,2011). *A. cerana*, the Asian hive bee or Himalayan hive bee, is widespread up to 3,000m throughout Asia. It has the gentle temperament, an industrious nature and good hygiene qualities (Verma, 1990).

Trigona iridipennis is one of the most primitive honeybees, widely distributed in Asian countries. It is highly social and live in perennial colonies (Leonhardt *et al*, 2007), most abundant and effective pollinator of various flowering plants occurs in both natural habitats, agro ecosystems (Roubik, 1989). Forests provide excellent resources for bees and beekeeping, and bees are a vital part of forest ecosystems. The distribution and abundance of indigenous honeybee species in Magway region has not been so far. Thus present study was conducted to record the occurrence and distribution of indigenous honeybee in two study area in Magway Region.

Materials and Methods

Study areas and period

Two study sites were selected in Magway Region. Magway University Campus is located on Taungdwin road and South of the Magway at 20º 08.24′N and 094º 56.14′E. Yae Poke Village is located on Salin-Pwint Phyu highway at 20º 13.55′N,094 º 48.82′E. The study was carried out during June 2019 to January 2020.

Specimen collection

Specimen collection was done through direct observation and interviews with the local residents. Field visits were made to two townships and interviewed honey hunters and dealers to investigate the occurrence of honeybees in places such as markets, gardens, vegetable farm yard, the forest area and building where bees usually come to collect pollen and nectar. The insect net with a long- handle was used for collection of bees from tall trees. When collect from bee hive, honey bees were driven from the comb with smoke, some honeybees were caught using net and a piece of comb was also taken for further study of the structure of comb.

Measurement of specimens

Collected bees were preserved in 70 percent ethanol for further identification. From the preserved specimens, 10 honeybees with well distended abdomen from each caste were used for measurements. The collected specimens were measured by scale showing micro-centimeter. The wings, legs, antenna and head with mouth parts appendages were cut off from the body and kept on the slide and observed under the dissecting microscope.

Identification

The honeybees were identified according to Bingham (1897) and Marks (2013). Identification of species was made based mainly on the morphometric characters of each species.

A. Magway University Campus

B. Yae Poke Village**Plate 1** Map of study sites (Source: Google Earth, 2019)

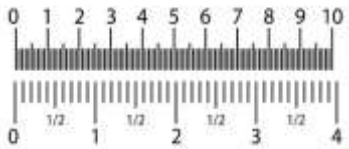
A. Magway University Campus

B. Yae Poke Village

Plate 2 Study sites

A. Insect Net

B. Dissecting Microscope



C. Ruler
(**Source:**VectorStock.com/23492502)

D. Digital Camera
(Cannon SX 430 IS 45 X)

E. Ethanol

F. Specimen Box

Plate 2 Materials used in result work

Results

A total of four honeybee species, *Apis florea, A. cerana, A. dorsata* and *Trigona iridipennis* belong to two genera under one family in one order were recorded in two study sites during the study period.

Morphometric characters of studied indigenous honeybees

Apis florea - Body length 10.8±1.18 mm (n=10); head, thorax and abdomen dull and opaque; slightly pubescent, the basal abdominal segments more or less red; younger workers are pale in color; the pubescence on the head and thorax white, on the posterior tarsi ferruginous golden; wings hyaline and iridescent.

Apis dorsata - Body length 15.15± 0.71 mm(n=10), Head, thorax and abdomen with short pubescent; head, thorax, legs and apical three segments of the abdomen black; the basal three segments of the abdomen honey-yellow; legs beneath, especially the posterior tibiae and tarsi, with short ferruginous pubescence; wings pale fuscous.

Apis cerana - Body length 12.55±0.5 mm(n=10), Head, thorax and abdomen smooth and shining, sparsely pubescent. Head thorax and apical abdomen segment black; the scutellum and basal five segments of the abdomen yellowish brown; legs rufo-fuscous, pubescence cinereous; wings hyaline and iridescent.

Trigona iridipennis - Body length 4.02±0.47 mm(n=10), predominantly blackish brown. Head is dark brown and is sparsely cover with yellowish-brown hairs. Compound eye is brown, and ocelli are brown and large. The abdomen is dark brown.

Habitat types and nests location of indigenous honeybee species

The nest of *A.florea* (dwarf honeybee) is a single and open nest, attached in the bushes and the branches of small trees. *Apis dorsata* (giant honeybee) also builds usually single and open nest, it is found overhanging from the branches of high trees and building. *Apis cerana* is cavity nesting bee, builds multiple comb and close type nest in tree hollows, house cavities as well as in the ground of cultivated fields and farmland. *Trigona iridipennis* builds nests in cavities of old logs and hollow trunks of old trees (Table 1).

A. *Apis Florea* (worker)


B. *Apis cerana* (worker)

C. *Apis dorsata* (worker)

D. *Trigona iridipennis* (worker)

Plate 3. Indigenous honeybee species collected from study areas

Monthly occurrence of honeybee species in two study sites

Apis florea (dwarf honeybee), *A. cerana* (cavity nesting honeybee), *A. dorsata* (giant honeybee) and *Trigona iridipennis* (stingless bee) were recorded in Yae Poke village. *Apis cerana* was not found in Magway University Campus during the study period.

In Magway University Campus, nests of *A. florea* were recorded throughout the study period. The nests of *A. dorsata* also found throughout the study period except in November. The species *Trigona iridipennis* was found only in November and January. *Apis cerana* was not recorded in this study site (Table.2).

In Yae Poke village, *A. florea* species was found during the study period except in July. *Apis dorsata* was found in the months of July, August and December. *Apis cerana* was recorded only in July and December. The species *Trigona iridepennis* was recorded in July, September, November, December and January (Table.3).

Distribution of studied honeybee nests found in two study sites

In the present study, nests of *Apis florea* were abundance of number 96 nests as 78% of total recorded honeybee nests, followed by number 13 nests as 11% in *A. dorsata*, 12 nests of *Trigona iridipennis* 8% and the lowest number 2 nests of *A. cerana* 3% were recorded in two study sites (Table. 4).

For percentage of individual species in each study site, *A. florea* was recorded that the highest percentage by 85.33% in Magway University Campus and 66.67% in Yae Poke village. *A. dorsata* was recorded that the highest percentage by 12% in Magway University Campus, followed by 8.33% in Yae poke village. *A. cerana* was recorded that highest percentage by 4.17% in Yae Poke village and 0% in Magway University Campus. *Trigona iridipennis* was recorded that the highest percentage by 20.83% in Yae Poke village, followed by 2.67% in Magway University Campus (Figure.1, Table. 4).

A. Nest of *Apis florea*

B. Nest of *Apis cerana*

C. Nest of *Apis dorsata*

D. Nest of *Trigona iridipennis*

Plate 4 Nests of indigenous honeybee species

Table 1 Habitat types and nests location of studied indigenous honeybee species

Scientific Name	Common Name	Local Name	Habitat Types	Nest Location
A. florea	Dwarf honeybee	Yin Pya	Single comb/open type	Bushes, branches of small tree
A. dorsata	Giant honeybee	Pya Gyi	Single comb/open type	Branches of high trees, building
A. cerana	Cavity nesting bee	Thit Khaung Pya	Multi comb/close type	Tree hollows, house cavities, ground of cultivated fields and farmland
T. iridipennis	Stingless bee	Myat Hmwe Lain	Cavity nest/close type	Cavities of old logs, hollow tree trunks of old trees

Table 2 Monthly occurrence of honeybee species in Magway University campus (2019-2020)

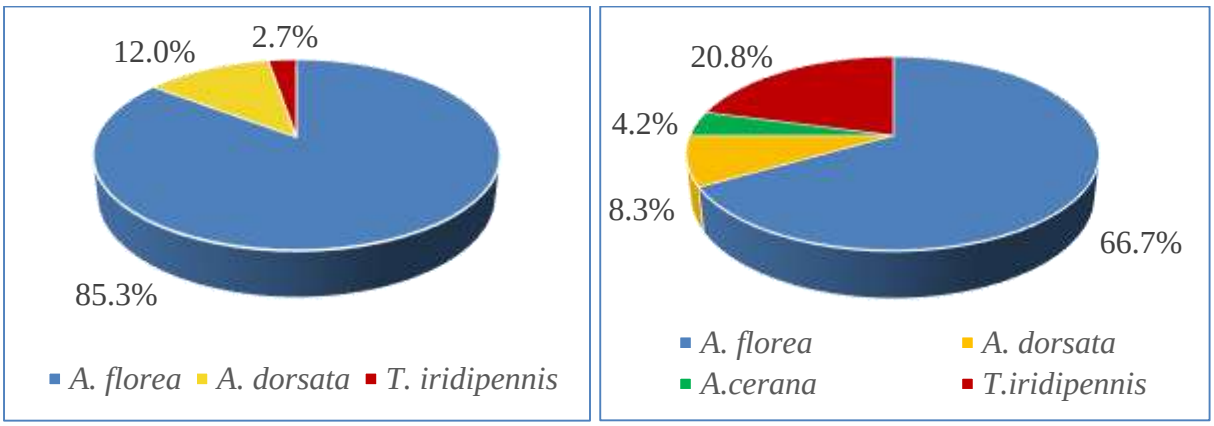
Monthly	*A. florea*	*A. cerana*	*A. dorsata*	*Trigona iridipennis*	Total
June	√	-	√	-	2
July	√	-	√	-	2
August	√	-	√	-	2
September	√	-	√	-	2
October	√	-	√	-	2
November	√	-	-	√	2
December	√	-	√	-	2
January	√	-	√	√	3

Table 3 Monthly occurrence of honeybee species in Yae Poke village (2019-2020)

Month	*A. florea*	*A. cerana*	*A. dorsata*	*Trigona iridipennis*	Total
June	√	-	-	-	1
July	-	√	√	√	3
August	√	-	√	-	2
September	√	-	-	√	2
October	√	-	-	-	1
November	√	-	-	√	2
December	√	√	√	√	4
January	√	-	-	√	2

Table 4 Distribution percentage of individual species in two study sites

Species	Magway University Campus		Yae poke Village		Total
	Number of nests	Distribution Percentage(%)	Number of nests	Distribution Percentage (%)	
Apis florea	64	85.33	32	66.67	96
Apis dorsata	9	12	4	8.33	13
Apis cerana	-	0	2	4.17	2
Trigona iridipennis	2	2.67	10	20.83	12
Total	75	100	48	100	123



A. Magway University Campus B. Yae Poke Village

Figure 1 Percentage of studied honeybee species found in the two study sites

Discussion

A total of four species of honeybee (*Apis florea*, *Apis cerana*, *Apis dorsata* and *Trigona iridipennis*) belong to two genera, one family and one order were recorded in during study period.

The presence of honeybee species and their distribution in two study sites of Magway Region were recorded. In the present work, three species of genus *Apis* (honeybees) and only one species of genus *Trigona* (stingless bees) were recorded from Yae Poke village. Indigenous honeybee species *A. florea, A. dorsata and Trigona iridipennis* were found in Magway University campus. But *A. cerana* was not found in this site in the present study.

Hepburn (2011) studied that a nest of *A. florea* consist of a single comb, typically built in small tree. *A. florea* nests in the open, but nests are camouflaged. Bradbear (2009) noted that they are very small-sized species of bees, and their single comb nests are small too(Bradbear,2009). In this study, *A. florea* is small bees, single comb nests, attached in the bushes, branches of small tree and median-sized plants.

Bradbear (2009) also stated that *A. dorsata* bees are large, and their nests consist of single large combs suspended from a branch, cliff face or building. In this work, *Apis dorsata* is large bee, the nest is large comb, open in air, and build overhanging from the branches of high tree and buildings.

Gupta (2014) described that *A. cerana* is the Asiatic honeybee or the oriental honeybee because they are only found in Asia. *A. cerana* builds multiple parallel comb in a wide variety of

available cavities, including, for example, tree or palm hollows, rock crevices, and house wall cavities. In present study, *A. cerana* is cavity nesting bee, builds multiple parallel comb, which is found in tree hollow, disuse wells and house cavity.

Bradbear (2009) stated that stingless bees are also present throughout tropical and southern sub-tropical Asia. Gupta (2014) noted that they live usually in insects in hollow trunks, tree branches, underground cavities, or rock crevices. In this study, *T. iridipennis* is smallest bee, build nest in cavity of old logs, hollow trunks of old trees.

In Myanmar, Nyo Nyo Lwin (2007) described that seven species of honeybee such as *A. dorsata, A. cerana, A. cerana cerana, A. cerana indica, A. florea, A. andrineformis* and *A. mellifera,* two species of stingless bees such as *T. iridipennis and T. laeviceps* were recorded.

Myint Myint Htwe (2013) stated that the four species of honeybees *A.dorsata, A. cerana, A. florea, A. andrineformis* and one species of stingless bees were recorded in Central Myanmar. In this work, the three species of honeybees *A. florea*, *A. dorsata*, *A. cerana*, and one species of stingless bees, *T. iridipennis* were recorded in the study period and area.

In the present study, a total of 123 nests of honeybee were recorded during study period. In Magway University Campus, a total of 75 nests in two honeybee species *(A. florea, A. dorsata*), one species of stingless bee *(T. iridipennis)* were collected, and the lower number 48 nests in four species (*A. florea, A. dorsata, A. cerana* and *T. iridipennis)* were recorded from Yae Poke village.

During the study period, the indigenous honeybee species are abundantly found in December and January due to the rich food sources and fine weather while the lowest in June as the availability of floral resources is insufficient of this study sites.

Among two study sites, the indigenous honeybee species was found more abundant in Magway University Campus due to plentiful honeybee food sources such as seasonal cultivated plants, variety wild plants and abundance nesting plants, preferable weather conditions in this area. In Yae Poke village, the inadequate of food sources and nesting plants.

Conclusion

The indigenous honeybee species are the benefit pollinator as well as rich diversity of forests in this region. They are also help to increases crop yields and improves crop quality for the local people. Moreover, the local people obtain the incomes from the bee products. In this way, it benefits the local people.

In the other, the wild honeybee species are threatening the several conditions such as loss of their habitats, competition of introduced species, hazards of pesticides, overhunting, etc. According to these factors, the loss of indigenous honeybee species should be protected and vital role of indigenous honeybees should be maintained. Seasonal cultivated crops and variety of wild plants in this tropical region serve as provide bees forage. The conservation of the indigenous honeybees is the main component in the preservation of the native ecosystem of this region.

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