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ADAPTBILITY OF EUROPEAN HONEYBEE (*Apis mellifera L.*) IN MINDORO STATE UNIVERSITY (MINSU), VICTORIA, ORIENTAL MINDORO, PHILIPPINES

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ABSTRACT

A study on the adaptability of European honeybee was conducted and the amount of rainfall, and the temperature readings prevalent in the area as well as the number of plants that could supply nectar and pollen for the bees at the Mindoro State University (MinSU), Victoria, Oriental Mindoro that could possibly affect the *Apis mellifera L.* honeybee colonies were assessed and enumerated. Temperature readings as well as the average amount of rainfall in the area, favours the growth and reproduction of honeybees based on the actual count of the number of newly developed frames in the 6 standard beehives from the original 5 framer in nucleus boxes used in the study. Fourteen pollen and nectar plants were identified and sixty species identified as host plants for honeybee that could give nectar, pollen or both. Colony build-up continues in all of the beehives studied. Based on the results, and review of related literature, the *Apis mellifera L* is suitable for domestication in the ecosystem condition of MinSU.

Keywords: Apiculture*; Apis mellifera L.;* Honeybee; Mindoro State University.

INTRODUCTION

European honeybees (*Apis mellifera* L.) are domesticated for hive products such as honey, wax and royal jelly; meanwhile, their notable regulating services is pollination of agricultural crops. Thesehoneybeesare social insect that displays cooperation with other biotic factors incomparable in the animal kingdom (Winston, 1987). The*A. mellifera* were originated from Africa, and drifted to central Asia, and northern Europe. Theyare suitable in places with abundant flowering plants, that can be usually located in meadows, woods, and gardens. They also prefer grasslands, deserts, and wetlands considering that there are sufficient water, food, and shelter.Naturally,honeybees secrete wax for the queen to lay their eggs in cell compartments. Honeybees have four stages; egg, larva, pupa, and adult. Specifically, *A. mellifera* eggs hatch in 28-144 hours, and larva emerges from a small white grub.At 34°C, larvae feed and grow for 4-5 days, queens for 6 days, and males for 6-7 days. The Queens live 2-5 years but takes only 16 days to reach maturity, the worker bees matured in 21 days, and the drone takes 24 days to mature (Adjare, 1990; Sammataro and Avitabile, 1998). These projected growth and metabolism of the honeybees is also affected to the type of habitat where they build their hive.Moreover, honeybees need a body temperature of 35 °C (95 °F) to survive, and conduct their activities within their colony. This temperature maintenance is developed in the nest. Furthermore, the brood of the bees require this level of temperature for life cycle development, and creation of wax. Basically, appropriate location is important for the bees where they can thrive successfully, adapt and subsist. To prove the significance of choosing the fitting ecosystem for their habitat regardless of geographic location and for the purpose of domestication, this study tests the compatibility of *A. mellifera* in a tropical region like the Philippines. In order to elaborate their adaptive abilities,the following factors were considered; temperature, rainfall and humidity and sources of food.The study was conducted at Mindoro State University, Province of Oriental Mindoro, Philippines.

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MATERIALS AND METHODS

The study used 6 honeybee colonies, low-high thermometer, and recording of daily temperature, relative humidity and rainfall. For the source of food, flowering plants were gathered including bark, flower, stem and leaves near the study site. The number of visits to the flowering plants by the bees were observed to justify the plant species as to whether they were a source of pollen and nectar or both for this kind of insect. Additionally, the pollen basket of the bees was inspected for the presence of pollen.There are sample bees dissected for experiential purpose;the type of honey found in their stomach that contains newly collected nectar. Five sites in MinSU forest and land reservation areas were visited, and the available flowering plants. In addition, the fruit trees and forest trees were also identified, enumerated and observed. The study also recorded the daily condition of the rainfall, relative humidity and minimum and maximum temperature readings for 12 months. These data were utilized to have the averages of these environmental factor readings for the whole year, then were compared on the literature being reviewed. The colonies were assessed if there was an increase in the population. This was done by counting the number of frames with active wax buildup and having honey deposit,and broods.

RESULTS AND DISCUSSIONS

Temperature

The average high and low temperatures of the testing site during the study period shows that honeybees were productive in building their hive. The compartments of the wax and brood seems firmly established.This is an implication that the European honeybee can survive in the ecosystem factors of MinSU with respect to the average of monthly temperatures in the area (see Figures1 & 2). Based on the results, during the month of January the temperature was usually around 21.02°C (min. temp. at the start of January)- 28.70°C (max. temp. at the start of January),considered best for Apiculture as a minimum heat requirement.Bees reproduce and grow efficiently at

around 34^{0}C,and development of the young is influence by a temperature of 33-36°C (Adjare, 1990; Sammataro&Avitabile, 1998). This is a justification that the selected site for the habitat introduction of *A. mellifera* with its average temperature reading all thru the years is compatible with the studied species of bee.

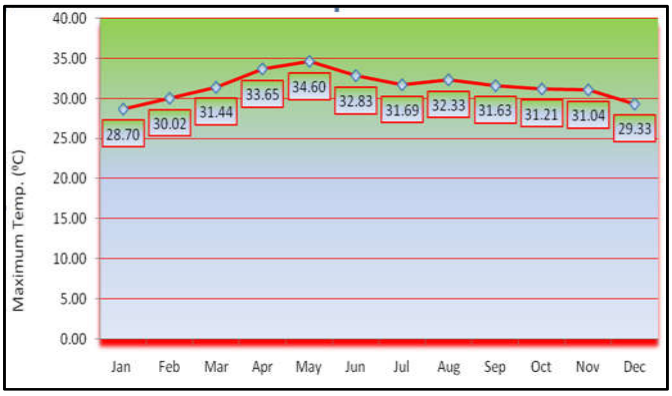

Figure 1. Monthly Average Maximum Temperature in Mindoro

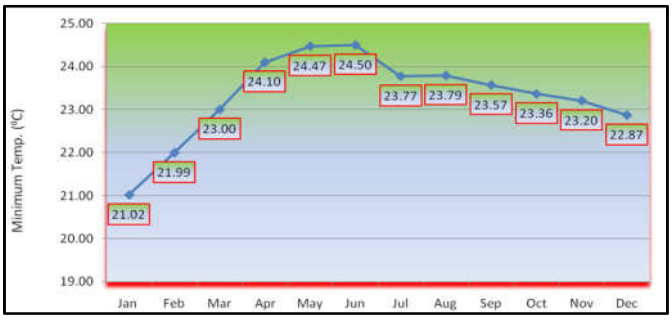

Figure 2. Monthly Average Minimum Temperature in Mindoro

Amount of Rainfall

The highest rainfall average of the study site was 13.12 mm, during the month of December. Meanwhile,the remaining months were below 10 mm,this kind of rainfall average is very ideal for the survival and production of the studied species of honeybees. The *A. mellifera* will have a longer period of production, and establishment of their hive with so many months of having a below 10 mm rainfall average. The studied species of bees under this condition of the testing site were observed productive as shown in the buildup of wax, and size of their colony.

Figure 3. Average Monthly Rainfall in Mindoro

Food for the Bees

MinSU has an annual crop, biennial as well as perennial crops including shrubs and trees as vegetation cover around the University. This diversity of plants inhabiting MinSU can provide a source of food, and nectar for the studied honeybees. In Table 1,the identified major pollen and nectar plants in MinSU were enumerated; meanwhile in Table 2 are the list of host plants for honeybees to collect pollen and nectars. With this sufficient source of food, honeybee may thrive well under the condition of the University.

Table 1. Major Pollen & Nectar Plants available in MinSCAT

PLANTS	POLLEN	NECTAR	FLOWERING SEASON
Acacia	/	/	February to April
Avocado	/	/	January to February; April to May
Camote	/	/	November to April
Cashew	/	/	December to February
Citrus	/	/	March to May
Coconut	/	/	Year round
Coffee	/	/	December to May
Dapdap	/	/	January to March
Duhat	/	/	February to March
Gmelina	/	/	March to April
Mahogany	/	/	March to April
Mango	/	/	December to February; April to May
Narra	/	/	April to May
Tamarind	/	/	May to June

Table 2. Host plants for the Honeybee available in Mindoro

FOOD CROPS	FRUIT TREES AND OTHER TREES	NON-FOOD CROPS
Ampalaya	Banana	Abaca
Black pepper	Coconut	Acacia
Eggplant	Cashew nut	Beetle nut palm
Mustard	Citrus	Cadena de amor
Mungo	Coffee	Gmelina
Luffa gourd	Papaya	Golden shower
Pepper	Pili	Ground mimosa
Pechay	Rambutan	Ipil-ipil
Jute	Santol	Kapok
Sweet potato	Mango	Kudzu
Tomato	Guava	Madre de cacao
Bottle gourd	Kalantas	Marigold
Squash	Malapapaya	Narra
Moringa	Toog (Phil. Rosewood)	Santan
Cowpea	Aratilis	
Sitao	Macopa	
Peanut	Duhat	
Cauliflower	Ipil-ipil	
Cucumber		
Cabbage		
Carrot		
Chayote		
Eggplant		
Garlic		
Lettuce		
Onion		
Hyacinth bean		

CONCLUSION

MinSU environment is suitable for apiculture as the *A. mellifera* shows productivity in the size of their colony, production of honey, and propagation. The successful rate of their adaptability is due to the available foods for honeybees in the study site such as crops grown and forest, and grasslands that supports the growth of bee colonies and their production. Moreover, amount of rainfall, and temperature also influence their abilities to survive the ecosystem of MinSU.

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Author Contribution

NHD: Crafting of research concept and data collection, discussion and analysis.

Conflicts of Interest

The author declares no conflict of interest.

Ethics Approval

The author asked permission to conduct the study inside MinSU through personal appearance dialogue and request letter on the management office of the University.

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