



**UNIVERSITI PUTRA MALAYSIA**

***NESTING ECOLOGY OF BAYA WEAVER (*Ploceus philippinus* Linn.  
1766) IN SELECTED AREAS OF PERLIS AND SELANGOR***

**THIRUVINOTHINI A/P THIRUVENGGADAM**

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By

**THIRUVINOTHINI A/P THIRUVENGGADAM**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra  
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Science**

**July 2020**

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in  
fulfilment of the requirement for the degree of Master of Science

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**Chair : Associate Professor Marina Mohd. Top @ Mohd. Tah, PhD**  
**Faculty : Science**

In Malaysia, Baya Weaver is protected under the country's Wildlife Conservation Act 2010. Baya Weavers nests can be commonly sighted in agricultural and grassland areas in Malaysia but little study thus far has been conducted locally to understand its nesting ecology and nest structure. During breeding seasons, female Baya Weavers inspect the incomplete nest built by the male birds before choosing the ideal nest for reproductive purposes. The chosen nests by female Baya Weavers are indicated by its completed structure by male Baya Weavers. The objectives of this research were to examine factors affecting the nesting tree selection of the Baya Weaver, to identify the structure of a nest that is important for a female Baya Weaver's choice for egg-laying, and to examine the effect of climatic factors on the nest structure. A total of eight study sites were chosen to represent the northern (Perlis) and southern regions (Selangor) of Malaysia. A total of 34 complete nests and 12 incomplete nests from Selangor and 32 complete nests and 15 incomplete nests from Perlis were observed and measured from August 2018 to April 2019. The study showed that there were no specific tree species that contributed to the nest tree selection of Baya Weavers, and the height of trees was a contributing nest tree selection factor in Perlis. The size of the egg chamber, nest suspension length and branch thickness were significantly different between complete and incomplete nests in Selangor (Mann-Whitney U,  $p < 0.05$ ) while only the size of egg chamber showed significant differences between complete and incomplete nests in Perlis (Mann-Whitney U,  $p < 0.05$ ). This showed that the size of the egg chamber played a role in female Baya Weaver's nest choice in both states. The microclimate inside and outside the nest varied in both states wherein Selangor study sites, the temperature and light intensity varied inside and outside the nest, and in Perlis study sites the light intensity and humidity varied inside and outside the nest. The results of this study showed that the height of nesting trees, size of the egg chamber and nest climatic factors influence the nesting ecology of Baya Weavers in the study sites of Selangor and Perlis.

Keywords: Baya Weaver, nest, nest structure, microclimate, microhabitat



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia  
sebagai memenuhi keperluan untuk Ijazah Master Sains

**EKOLOGI PEMBINAAN SARANG BURUNG TEMPUA (*Ploceus philipinus*  
Linn. 1766) DI KAWASAN-KAWASAN TERPILIH DI SELANGOR DAN  
PERLIS**

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Di Malaysia, burung Tempua dilindungi di bawah Akta Pemuliharaan Hidupan Liar Tahun 2010. Sarang burung Tempua biasanya dijumpai di kawasan pertanian di Malaysia, namun hanya beberapa kajian tempatan telah dijalankan untuk memahami struktur sarang dan ekologi pembuatan sarang burung Tempua. Sewaktu musim pembiakan, burung Tempua betina akan memeriksa sarang yang tidak lengkap yang dibina oleh burung jantan sebelum memilih sarang yang paling sesuai untuk tujuan pembiakan. Sarang yang dipilih oleh burung Tempua betina menunjukkan sarang yang telah disempurnakan oleh burung Tempua jantan. Objektif kajian ini adalah untuk mengkaji faktor-faktor yang mempengaruhi pemilihan pokok untuk membina sarang, mengenal pasti struktur sarang yang mempengaruhi pemilihan sarang oleh burung betina untuk tujuan pembiakan, dan mengkaji kesan faktor iklim terhadap struktur sarang. Lapan kawasan di Selangor dan Perlis dipilih untuk menjadi tapak kajian di mana kawasan ini dipilih untuk mewakili negeri di bahagian utara (Perlis) dan selatan (Selangor) Malaysia. Sebanyak 34 sarang lengkap dan 12 sarang tidak lengkap dari Selangor dan 32 sarang lengkap dan 15 sarang tidak lengkap dari Perlis direkodkan dari Ogos 2018 hingga April 2019. Kajian mendapati bahawa faktor yang menyumbang kepada pemilihan tapak pembinaan sarang burung Tempua tidak tertumpu kepada spesies pokok. Saiz ruang telur, kepanjangan tangkai sarang dan ketebalan ranting menunjukkan perbezaan signifikan antara sarang lengkap dan tidak lengkap di Selangor (Mann-Whitney U,  $p < 0.05$ ) manakala hanya saiz ruang telur menunjukkan perbezaan yang signifikan antara sarang lengkap dan tidak lengkap di Perlis (Mann-Whitney U,  $p < 0.05$ ). Kajian menunjukkan bahawa saiz ruang telur memainkan peranan dalam pemilihan sarang burung Tempua betina di kedua-dua negeri. Faktor iklim mikro di dalam dan luar sarang burung Tempua menunjukkan perbezaan di kedua-dua negeri. Di tapak kajian Selangor suhu dan keamatan cahaya berbeza di dalam dan di luar sarang, manakala di tapak kajian Perlis, keamatan cahaya dan kelembapan relatif menunjukkan

perbezaan di dalam dan di luar sarang. Hasil kajian ini menunjukkan bahawa ketinggian tapak pembinaan sarang burung Tempua, saiz ruang telur, dan faktor iklim sarang mempengaruhi ekologi pembinaan sarang burung di tapak kajian Selangor dan Perlis.



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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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## LIST OF ABBREVIATIONS

BT	Branch Thickness
CV	Crown Volume
DBH	Diameter at Breast Height
EC	Egg Chamber
ETH	Entrance Tube Hole
ETL	Entrance Tube Length
H	Height of tree
HC	Height of Complete Nest
HIn	Height of Incomplete Nest
M	Meter
R	Correlation Coefficient
RH	Relative Humidity
TL	Total Length

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background of Study

Weaver birds, as the name suggests, are known for their elaborately woven nests are substantially part of the large Old World family Ploceidae. The birds range from 13-26 cm in size and have a finch-like appearance (Campbell & Lack, 2010). The nests differ in size, shape, materials used, building techniques, and by species. Weavers are seed-eating granivore birds with rounded and conical bills, and most of the weaver species breed in sub-Saharan Africa, with a lesser number of species in tropical Indo-Malayan region, and on islands in the Indian Ocean (Del Hoyo et al., 2010). While a large population of weaver bird species can be found in the African region, five species can be found in the Asian region in paddy fields and cultivation lands. One of the species, *Ploceus philippinus* ranges from India, Sri Lanka, Bangladesh, south-west China, Burma, Sumatra and Java (Sridhara, 2016). These birds are also widely distributed at Peninsular Malaysia (Davison & Yeap, 2018).

Their diet includes ripe cereal crops, insects and occasionally they pick up seeds from grass stems. The adult male Baya Weaver resembles a sparrow but with brown streaks, thick bill and short round tail. These birds are sexually dimorphic birds where the male has golden-yellow plumage on the breast and head during breeding seasons (Robson, 2019). Baya Weavers are colony birds, and build nests in colonies near plantations or paddy fields, where food supply can be conveniently found (Robson, 2019). While some birds build their nests by concealing the nests from eyes of predators, the nests of Baya Weavers are especially large and can be easily spotted. The most unique and prominent feature of these birds is their hanging large, globular, intricately woven nests. Hence, weavers build their nests higher from the ground to avoid terrestrial predators (Collias, 2016). Within the nest structure, there are different stages of the nests that are built by the male birds, namely the wad stage, the ring stage, helmet stage, and finally the completed nest with an entrance tube (Asokan, Ali, & Nagarajan, 2008). If a female accepts a helmet stage of the structure which is also known as the incomplete nest, the male and female birds then will complete the nest, and egg laying may follow immediately after the flow of the brood chamber has been woven (Quader, 2003).

## 1.2 Problem Statement

Locally known as Ciak Tempua, humans often eye Baya Weaver nests for the unique appearance. These local birds are protected under the country's Wildlife Conservation Act 2010. The distribution and collection of their nests in Peninsular Malaysia are regulated by a licensing system. However, TRAFFIC reported an incident in 2016 where close to 1500 Baya Weavers were found in illegal possession for sale ("Large weaverbird seizure in northern Peninsular Malaysia - Wildlife Trade News from TRAFFIC", 2020), and an uncontrolled collection of Baya Weaver's nests could pose a possible threat to this species. The nature of Baya Weaver's habitat which is located at open grasslands in urban and agricultural areas and far from the deep forest and also far from human settlements poses a question on what kind of nesting sites and trees are preferred by Baya Weavers as their nesting location for the safety of their environment. Despite the expansion of urban environment in this country, we remain largely ignorant of the degree to which Baya Weavers can survive and build nests at the side of a highway, nearby heavily populated buildings and sometimes even at telephone cables (Reddy, 2011). Questions also arise on how Baya Weavers can survive the changing climate and how these birds regulate their nesting ecology in urban and agricultural areas.

This study aimed to answer these questions by examining Baya Weaver's nests in Selangor and Perlis. Selangor is known as Malaysia's most industrialized state (Hanafiah, Yussof, Hasan, Abdulhasan & Toriman, 2018) whereby Perlis's land use is dominated by agricultural practices (Jaafar, Wahab & Oman, 2013). Baya Weaver nests can be observed in rural and agricultural areas of both states. The female Baya Weaver chooses a nest completed by a male in order to complete reproduction. However little documentation is locally available on whether the structure of the nest that contributes to the female's choice.

Even though the population of Baya Weavers is listed as Least Concern according to the IUCN Red List, the present urbanization trend that is increasing rapidly and global climatic changes urge the need to increase the knowledge of birds that thrive near human habitations and the climatic factors that may affect the nesting ecology of these birds. By understanding the factors influencing the nesting ecology of Baya Weavers, targeted conservation interventions can be designed and executed in the future when needed.

### **1.3 Objectives**

The objectives of this study were:

1. To examine the factors affecting the nest-tree selection of Baya Weavers in Selangor and Perlis.
2. To identify the structure of a nest that is important for a female Baya Weaver's choice for nest structure completion by male Baya Weavers to commence reproduction.
3. To examine the effect of climatic factors on nest structure.

### **1.4 Hypothesis**

The hypotheses of this study were:

1. There will be a difference in trees measurements between nesting trees and nearest non-nesting trees characteristics.
2. There will be a difference in nest structure measurements of complete and incomplete nest.
3. There will be a difference in macroclimate and microclimate measurements in complete nests.

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