IDENTIFICATION OF (QUID AROMA FOR SWIFTLET RANCHING

ONG FOO KHENG

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Faculty of Industrial Sciences and Technology
Universiti Malaysia Pahang (UMP)

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ABSTRACT

Bird's nest is an excellent restorative food with a sweet and calm character; it is good for any age or gender. Therefore bird's nest is highly popular among the Chinese communities. This make swiflets ranching industry is growing stronger and stronger in our nation. The major swiftlet ranching areas are located mostly in secondary and tertiary townships where food source is in abundance and pollution levels are at their relative minimum. Bird's nest is actually dried saliva of swiftlet, therefore in swiftlet farming; owners tend to have various kinds of way to attract swiftlet to their bird house. However some birdhouse owners complained that they are not getting the desired result that very few swiftlets are staying in their house to build their nests. Basically it is affected by a few parameter which is sound, design of bird house, location and also aroma attraction. Therefore the objective of the study is to analysis chemical compounds in aroma using solid phase microextraction (SPME) with coupled with gas chromatography-mass spectroscopy (GC-MS). By using all these powerful analytical instrument, able to detect compound that present in liquid aroma that use to attract swiftlet to build nest in the bird house. For volatile chemical compounds, SPME which coupled with GC-MS is used. Therefore by using these method, able to identify chemical compounds to attract bird swiftlet to bird house.

ABSTRAK

Sarang burung walit merupakan sejenis makanan yang dapat mengembalikan dan menambah tenaga badan. Ia adalah sesuai bagi setiap peringkat masyarakat tidak kira sama ada lelaki atau perempuan, muda atau tua. Sarang burung walit sangat terkenal di kalangan masyarakat cina. Oleh itu, industri perternakan burung walit telah berkembang dengan kadar yang amat memberangsangkan di negara kita. Biasanya, penternakan burung walit terletak di kawasan luar bandar dimana sumber makanan adalah mencukupi dan keadaan pencemaran alam adalah minimum. Sebenarnya, sarang burung walit berasal daripada air liur burung walit yang telah kering, oleh itu, dalam penternakan burung walit, penternak telah menggunakan pelbagai cara untuk menarik perhatian burung walit untuk membuat sarang di rumah burung. Walaubagaimanapun, terdapat juga penternak yang hanya berjaya menarik segelintir burung walit untuk membuat sarang di rumah burung yang disediakan. Sebenarnya untuk menarik burung walit untuk membuat sarang di rumah burung adalah dipengaruhi oleh beberapa faktor, iaitu bunyi, reka bentuk rumah burung, lokasi dan juga penggunaan aroma. Oleh itu, objektif tujuan kajian ini adalah untuk menganalisis sebatian kimia yang terdapat dalam aroma dengan menggunakan mikroekstraksi fasa pepejal (SPME) berpasang dengan kromatografi – pengesan pengionan nyalagas-spektroskopi jisim (GC-MS). Dengan menggunakan kelengkapan analisis ini, adalah mampu mengesan komponen kimia yang terdapat dalam aroma yang digunakan untuk menarik perhatian burung walit untuk membina sarang di rumah burung. Bagi komponen kimia yang mudah meruap, SPME yang berpasang dengan GC-MS akan digunakan. Dengan kaedah ini, akan dapat mengenal pasti sebatian kimia dalam aroma cair yang digunakan untuk menarik perhatian burung walit.

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LIST OF SYMBOLS

°C	Degree Celsius
%	Percentage
α	Alpha

LIST OF ABBREVIATIONS

CAS	Chemical Abstract Service
CCTV	Closed Circuit Television
cm	Centimeter
DVB	Divinyl Benzene
eV	Electron Volt
GC-MS	Gas Chromatography- Mass Spectrometry
gm	Grams
HS	Headspace
kHz	Kilohertz
m	Meter
µm	Micrometer
min	Minute
mL	Mililiter
mm	Milimeter
NIST	National Institute of Standard and Technology
PDMS	Polydimethyl Siloxane
Pfs	Peak Frequency
Ppt	Part per Trillion
Sec	Seconds
sp	Species
SPME	Solid Phase Microextraction
Tr	Trace

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

For the past 5 years, swiflets industry has arise strongly in our nation as due to price and well known nutritious value of edible bird' nest. However, this industry is still a relatively new industry as compared to other fundamental and long standing industry like rubber, palm oil, oil and gas.

On the other hand, the edible bird' nest industry have much longer history of over 100 years ago and was only primarily made up by cotton style operations. The mainly source of bird's nest is from indigenous suppliers who collect the nests from caves, which are natural habitat of edible nest swiftlets. As the swiftlets ranching continue to grow in the country, more and more supplies of edible bird's nest came from purpose built farm that build for swiftlet farming have made their way into the supply chain (Merica, 2007).

The swiftlet farming in Malaysia have the potential to expand into multi-million ringgits industry as the industry is very profitable and lower risk as compared to other industry. Besides that, the continuously growing demands for edible bird's nest by wealthy oversea places like Hong Kong, China and also local Chinese communities also being a major contributor to the fast growing of swiftlet farming industry. There is also a noticeable worldwide trend that being pursued internationally as well as pharmaceutical and herbal products companies using edible bird's nest as a base materials for producing natural and organic health supplement for local and also overseas consumption.

1.2 PROBLEM STATEMENT

Currently swiftlet farming in Malaysia essentially involves the conversion of people centric building into bird house that use to protect certains species of swiftlets (white edieble bird' nest swiflets or *Aerodramus Fuciphagus*) which can only found in South East Asian region (Merica; 2007). The design and construction of the bird house is for the purpose of accommodating such swiftlets population. A continuous vocalization of swiftlets chirp and mating sounds are played throughout the days on certain hours using speaker and audio that installed in the bird house. Such action is done in order to lure the swifltets that are flying to the bird house for mate and make the bird house as their new home (Tirok Swiftlet Farm, 2007c).

Some owners believe that by using aroma will able to increase the tendency of the swiftlets to nesting at the bird house. Certain kinds of liquid aroma is been used to lure the bird swiftlets to the bird house beside the other factors (Tirokswifts, 2007). Therefore is a need to identify the chemical compounds that are present in liquid aroma that's had been used to attract the bird swiftlets to the bird house in order verify the effectiveness of aroma in attracting bird swiftlets.

1.3 RESEARCH OBJECTIVE

There are two objectives to achieve in this project:

- To identify the chemical compounds that present in the liquid aroma that used to attract bird swiftlets to bird house.
- To study and compare the formulation used in different liquid aroma sample with bird shit

CHAPTER 2

LITERATURE REVIEW

2.1 SWIFTLET FARMING

2.1.1 Research Background

Swiftlet farming in Malaysia starts to grow after significantly after Asian Economic Crisis of 1997-1998. Many businesses especially small and medium sized experience a very difficult hard time during that period, many of them even have shut off throughout the country. Those premises were left empty due to the depressed economic environment at that time, therefore quite a lot landlord had decide that rather than leave it idle, they had converted it to swiftlet farms. Currently, Indonesia is the world largest bird's nest producer which is 100 tons per year, follow by Malaysia, Thailand and Philippines with output around 10 tons per year. However such output still unable to satisfy the world demand which mainly from China, Taiwan and Hong Kong for bird's nest (Jabatan Perhilitan Malaysia, 2008). Figure 2.1 shows an example of bird's nest.

Figure 2.1: Bird's nest

Source: Travel Kat (2011)

The edible-nest Swiftlet (*Aerodramus fuciphagus*) and black-nest Swiftlet (*Aerodramus maximus*) are protected species under the Protection of Wildlife Act, 1972 and any export/import of their nests requires a license from the Department of Wildlife and National Parks (Liz Price, 2011). Protection of Wildlife (Amendment) Order, (2003) which stipulates a payment of RM0.10 cent per gram or RM100 per kilogram for the import/ export licence. The licence to harvest birds' nests is RM200/year (Jabatan Perhilitan Malaysia, 2008). Table 2.1 shows the types of licenses needed to acquire for swiftlet farming:

Table 2.1: Types of license

Types	Agency
Premises license	Local Authorities
License to Harvest Bird's Nest	Department of wildlife and national parks
License for Bird's nest business	Department of wildlife and national parks
License for import / export wild life	Department of wildlife and national parks

Source: Jabatan Perhilitan Malaysia (2008)

2.2 SWIFLET

2.2.1 Introduction

There are 28 species of swiftlet in the world and 13 of it can be found in Malaysia. However there are only 2 species as shown in Figure 2.2 which are the edible-nest Swiftlet (*Aerodramus fuciphagus*) and black-nest Swiftlet (*Aerodramus maximus*) which build their nest by using their saliva have very high nutritious value to be commercialize as a health supplement food (Jabatan Perhilitan Malaysia, 2008) Swiftlet have narrow wings for fast flight, with a wide gape and small reduced beak surrounded by bristles for catching insect in flight (Alaine, 2004). Males and females swiftlets look similar and both play equal roles in nesting and rearing young. Most of the swifts nest in caves, on cliffs or in hollows of dead trees. They often use saliva as glue to hold their nests together and to attach them to the substrate. The nests of edible-nest swiftlets (*Aerodramus fuciphagus*) are a delicacy in some parts of the world like Hong Kong and China are used to make bird's nest soup (Alaine, 2004). As the swiftlets fly in the dark area of their nest cave, they tend to make sounds which are broad band clicks with peak frequency (PFs) between 1 and 16 kHz. Swiftlets appear to use echolocation only for low resolution target discrimination. It also is diurnal birds with large eyes and use vision to locate their prey (Fullard, 1993).

Aerodramus Fuciphagus ***Aerodramus Maximus***

Figure 2.2: Types of edible-nest swiftlet

Source: Ultimate Swiftlets Farming Consulation, 2011

2.2.2 Distribution

Distribution of swiftlets is confined to tropical Southern Asia and Oceania, Northeastern Australia and Indian Ocean. The greatest diversity is in Southeast Asia, Indonesia and Papua New Guinea. However there are several species are restricted to small island with their limited range that can make them very vulnerable like the Seychelles, Whitehead's and Guam swiftlets (Birdlife International species factsheet, 2011). In South East Asia, it covers Andaman Island and Nicobar, Hainan in China, Palawan Island in Philippines, coast and island in Vietnam, Cambodia, Thailand, Myanmar, Peninsular Malaysia, Singapore and island in Indonesia including Sumatra, Java and island of Sunda which is Borneo (Chantler et al., 2000). Figure 2.3 shows the distribution map of swiftlet while Table 2.2 summarized the differences between swiftlets species.

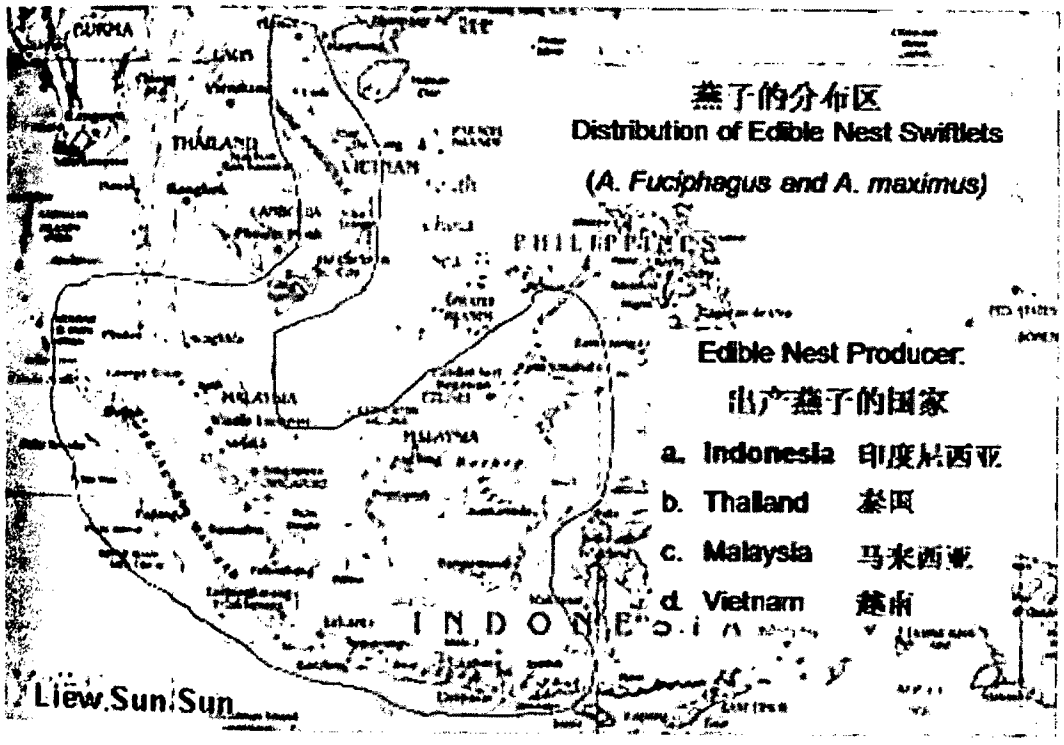

Figure 2.3: Map of distribution of swiftlets

Source: Golden Sunshine Enterprise (2011)

Table 2.2: Differences between swiftlets species

Parts	Edible-nest swiftlet	Black-nest swiftlet
Size	110-120 mm	120-135 mm
Feather	Top is black in color	Top is shining blue greenish Abdomen is white is color Neck to chest is grey in color
Nest	Made from saliva	Made from saliva and feather
Egg size and quantity	Small, size is 21 x 12 mm width. Two egg for each nest.	Big, size is 21.9-23.5 x 15.3-16 mm. One egg for each nest.
Sound	Chirp with high pitch when at nest.	Slow whistling

Source: Jabatan Perhilitan Malaysia (2008)

2.2.3 Nutrition

These swiftlets feed on insects they caught during flight in air. *Trichoptera sp* (sedge-flies), *Isoptera sp* (termites), *Ephemeroptera sp* (Mayflies) and also same beetles are the major food source for swiftlets (Jabatan Perhilitan Malaysia, 2008). Figure 2.4 until Figure 2.6 are the major food source for swiftlet.

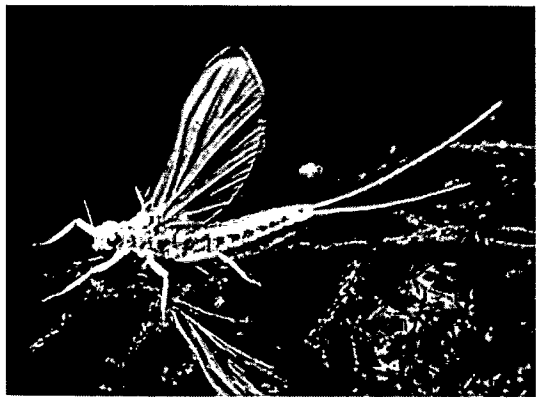

Figure 2.4: *Ephemeroptera sp*

Source: Discoverlife (2011)

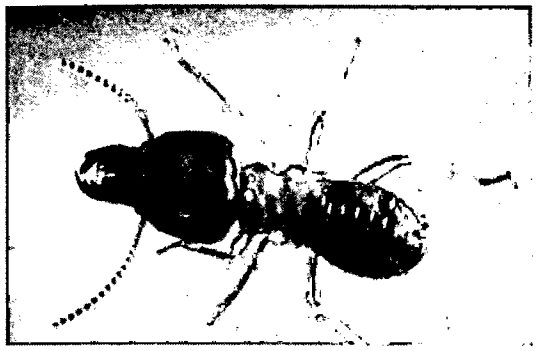

Figure 2.5: *Isoptera sp*

Source: Meyer (2005)

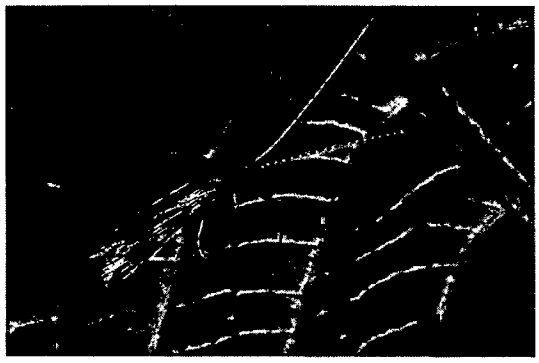

Figure 2.6: *Trichoptera sp*

Source: Wilson (2011)

2.2.4 Breeding Season

Usually edible-nest Swiftlets and black nest swiftlets will be mating in the air and usually their partner tend to be their lifetime partner. Swiftlets acquire multi incubation strategy where they will lay as much egg as they could while raising as many baby swiftlets as they could under appropriate weather and also great sum of food source (Jabatan Perhilitan Malaysia, 2008). During breeding season, a swiftlet's salivary glands enlarge enormously, enabling the bird to produce the saliva that binds the nest, which takes approximately one and half to two months to construct and usually holds one or two eggs (TBP swiftlet, 2011)

Table 2.3 refers that the breeding season for those swiftlets within one year. The breeding season for swiftlets start from January until December which mean whole year is their breeding season. However, although is whole year, but it will divide into three term in this whole year. For edible nest swiftlets the first term start from December until March, second term start from April and ends at July. The last term start from August until November. As for black nest swiftlets, first term of breeding season start from January until April, second term start from May until August while last term start from September until December. Figure 2.7 and Figure 2.8 shows the nesting of swiftlets.

Table 2.3: Breeding season table for edible nest swiftlets and black nest swiftlets

Edible nest swiftlets (*Aerodramus fuciphagus*)

JAN	FEB	MAC	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC
JAN	FEB	MAC	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC

Black-nest Swiftlet (*Aerodramus maximus*)

Key note:
- First term
- Second term
- Third term

Note: First row in the table is breeding season for edible nest swiftlet while next row is for black nest swiftlet.

Source: Jabatan Perhilitan Malaysia (2008)

Figure 2.7: Swiftlet start nesting in pairs

Source: Dig Deep (2011b)

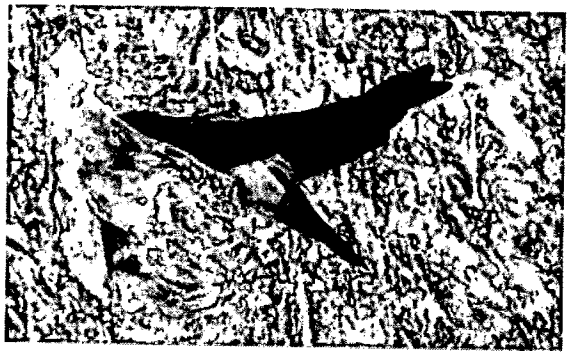

Figure 2.8: Nesting

Source: Yap (2010)

2.2.5 Bird's Nest

Both male and female swiftlet will work together nesting during the night. Bird's nest from edible nest swiftlets is fully made from saliva of swiftlets and it need around 30 days to complete the nest. As for the black nest swiftlets, the nest is made from saliva mixed with feather. It will require between 35 days to 127 days for the nest to be completed. Commonly the shape of the nest is half plate however the shape of the formation of nest is depend on the season (sunny/rainy) and also source of food (Jabatan Perhilitan Malaysia, 2008).