

INSECT ABUNDANCE IN RELATION TO EDIBLE NEST SWIFTLETS DIET IN PADDY FIELDS OF SEKINCHAN, SELANGOR

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Introduction

“Edible nest swiftlets” is a collective name referring to several species of swiftlets birds that can produce nest that can be eaten by human. The nest is used traditionally as a food delicacy and also an important ingredient in Chinese medicine for health enhancing effects including enhancing complexion, alleviating asthma and strengthening the immune system (Lim & Cranbrook, 2002). Swiftlet are generally referred to a group of small swift birds of family Apodidae. This bird is about the same with swallows, sparrows and house swift but they are not related to each other (Ibrahim et al. 2009). Swiftlets have a small body size, ranging from 9 to 13 cm long and weighs 7g to 21 grams and both sexes, male and female are the same look (Lim & Cranbrook 2002). An advantage lies on its feet with sharp, curved claws that allows it to perch the ceiling or wall as hard as in the cave as the place of resting and nesting (Lim & Cranbrook 2002). Swiftlets also have a pair of large eyes and dark look which very well enable it to catch prey while flying in the air (Lim 2011). In Malaysia there are two species of swiftlets that produce bird nests and have commercial interests. There are the *Aerodramus fuciphagus* also known as white-nest swiftlets and *Aerodramus maximus* called black-nest swiftlets and the nest produced by the different subspecies white-nest swiftlets are the most expensive because they are made entirely of pure hardened salivary nest cement (Lim & Cranbrook 2002). Swiftlet depends heavily on insects as the source of food as a basic need for life and productivity requirements (Norhayati et al. 2010). As a specialist insect-eating birds (insectivorous) they eat the insects as they fly through the air with the help of a very sharp vision (Lim 2011). In Malaysia, it was found that *Aerodramus fuciphagus* eat a variety of insects with dipterans as among Order the most they consumed (Laurie & Tompkins 2000, Nurul Afiah 2011).

Materials and Methods

The insect from the paddy field were collected by using malaise trap in 3 different locations. The bottle filled with 70% ethyl alcohol was used to restore and preserved the insect that had been trapped. Then, the bottles were transferred to the laboratory for further insect's identification. A total of 6 birds of *Aerodramus fuciphagus* were captured in paddy field area in Sekinchan, Selangor by using mist net and the bird caller was used to calling the birds. The birds were euthanised with barbiturates at 60mg/kg (AVMA, 2013). Then a post-mortem was done by taking out the food bolus from the gizzard. The food boluses were preserved with 70% ethyl alcohol and further identification the insects in the laboratory. The food bolus containing complete insect formation were examined under microscope at 20 x magnifications or more to identify the insect to the Order level and for Diptera and Hymenoptera were identified to the family level. For further identification of the insect that cannot be identified, they were stored in 99% ethanol for preservation for molecular analysis.

Results

A total of 6,493 insects belonging to 9 Order were successfully collected. The rice variety in the fields was MR220 CL2.

Table 1: Cumulative number of individuals Insect Order in Paddy Field Area in Sekinchan, Selangor

Month	Insect Order									Total
	Diptera	Hymenoptera	Lepidoptera	Hemiptera	Coleoptera	Othoptera	Isoptera	Ordanata	Neuroptera	
Feb-14	447	12	48	0	24	6	6	3	0	546
Mar-14	2258	15	45	3	9	0	0	0	0	2330
Apr-14	1326	21	143	80	8	5	0	0	0	1583
May-14	1599	105	249	0	51	6	6	15	3	2034
	5630	153	485	83	92	17	12	18	3	6493

There was a significance difference in the total of insect Order which varies by month ($x^2_{\text{obtained}}=1,023.87 > x^2_{\text{critical}}=7.814$, $df=3$, $\alpha=0.05$). There was a varied significance difference in all Order insect individually among months collected. For Dipterans morphospecies, $x^2_{\text{obtained}}=19,630.7 > x^2_{\text{critical}}=7.81473$, $df=3$, $\alpha=0.05$. For Hymenopterans, $x^2_{\text{obtained}}=156.4 > x^2_{\text{critical}}=7.81473$, $df=3$, $\alpha=0.05$. For Lepidoptera, $x^2_{\text{obtained}}=230.70 > x^2_{\text{critical}}=7.81473$, $df=3$, $\alpha=0.05$. For Hemiptera, $x^2_{\text{obtained}}=225.87 > x^2_{\text{critical}}=7.81473$, $df=3$, $\alpha=0.05$. For Coleoptera, $x^2_{\text{obtained}}=52.43 > x^2_{\text{critical}}=7.81473$, $df=3$, $\alpha=0.05$. For Orthoptera, $x^2_{\text{obtained}}=24.72 > x^2_{\text{critical}}=7.81473$, $df=3$, $\alpha=0.05$. For Isoptera, $x^2_{\text{obtained}}=12 > x^2_{\text{critical}}=7.81473$, for Ordanata, $x^2_{\text{obtained}}=34 > x^2_{\text{critical}}=7.81473$ and Neuroptera, $x^2_{\text{obtained}}=8.99 > x^2_{\text{critical}}=7.81473$.

The 2 main insect Order, Diptera and Hymenoptera were mainly found in the previous study for White-nest Swiftlets. Results showed the main family of Diptera found was Chironomidae with 3,009 (48.1%) individuals followed by Muscidae with 2,049 (32.76%) and Sciaridae with 294 (4.7%) individuals from the total of 22 morphospecies had been identified. For the Hymenopterans families, the most abundance was Apidae with 66 individuals, followed by Ichneumonidae with 30 individuals and Formicidae with 24 individuals from 8 morphospecies had been identified.

Results from insect collection from the swiftlets morphological data revealed that a total of 5 insect Order (Hymenoptera, Diptera, Coleoptera, Isoptera and Neuroptera) were found to be the swiftlet's diet. The families found for Diptera were Dolichopodidae and Sphaeroceridae and for Hymenopterans was Formicidae. The molecular test showed that the insect Order found were Diptera with 1 family was Chironomidae, Coleoptera Order with 2 families were Staphylinidae and Carabidae and for Lepidoptera Order with 1 family was Papilionidae.

Discussion

The edible nest swiftlet is an insectivorous bird that mainly consumed the insect for their food. They track and capture airborne prey with the mouth in flight (Lim & Cranbrook 2002). The food bolus of their diet contain more than 100 items and the wide range of arthropod prey including Hymenoptera, Diptera, Coleoptera, Homoptera, Arachnida and several other orders (Lourie & Tompkins 2000). From the result showed that Diptera was the most insect Order abundance in the field area. These can be related to the previous study found that *Aerodramus fuciphagus* or White-nest Swiftlet diets was taking a large proportions of Diptera insect order and their diets also relatively more diverse compare to Black-nest

Swiftlet (Lourie & Tompkins 2000). From the study, the most Diptera family found in the field was Chironomidae and also found in the swiftlets diet. Regarding to Che Salmah & Abu Hassan 2002, the Chironomidae are known found and colonizers in the paddy field as soon as the water sets in. Molecular result revealed that Chironomidae was found in the swiftlets diet and these were the insect in abundance is in relation with the insect that had been eaten by the swiftlet birds in the paddy field areas. The swiftlet diet also contain insect form small Order Coleoptera including Staphylinidae and Carabidae which have distinctive feature of more harder wings structure called as elytra (Borror & DeLong 1971). Nurul Afikah 2011 revealed that the swiftlets, *Aerodramus fuciphagus* faeces called guano consist of winged ants, wasps of the Hymenoptera and also have the higher proportion of the complete body structure, mandibles, head structures, elytra and leg fragments of Coleoptera. The food bolus also contain the other insect Order including Hymenoptera, Isoptera, Neuroptera and Lepidoptera also abundance in the paddy field area. These observations therefore suggest that swiftlets hunt opportunistically rather than selectively to find their food (Lim & Cranbrook 2002).

Conclusion

The insect abundance in the agricultural area such as paddy field gives favourable environment to attract edible nest swiftlet to find their food. However, the seasonal rice cultivation method remains a restriction for the swiftlet to depending on that type of agricultural area for the only food source.

References

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