

Kertas Asli/Original Articles

The First Report of *Lasioderma Serricorne* Infestation on Dried Fish Crackers in Malaysia

(Liputan Pertama Infestasi *Lasioderma Serricorne* pada Keropok Ikan di Malaysia)

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ABSTRACT

This paper is the first record of cigarette beetles collected from dried fish crackers (also known as “keropok ikan” in Malay) in Malaysia. The dead cigarette beetles were firstly isolated from a packet of dried fish crackers and were subsequently kept in 70% ethanol. The beetles were then identified as Lasioderma serricorne (Fabricius 1792) (Coleoptera: Anobiidae). They are common pests of stored products such as tobacco, flour, and cocoa beans but there is no record of this beetle infestation on dried fish crackers in Malaysia.

Keywords: Cigarette beetles; fish crackers; Lasioderma serricorne; stored products

ABSTRAK

Artikel ini merupakan liputan pertama penemuan kumbang tembakau pada keropok ikan di Malaysia. Kumbang tembakau terlebih dahulu diasingkan daripada paket plastik yang mengandungi keropok ikan. Kumbang yang telah mati dikira dan disimpan di dalam 70% etanol. Kumbang tersebut kemudian dikenalpasti sebagai Lasioderma serricorne (Fabricius, 1792) (Coleoptera: Anobiidae). Kumbang tembakau sering ditemui sebagai serangga perosak untuk produk simpanan seperti tembakau, tepung, dan biji koko. Walau bagaimanapun, rekod infestasi kumbang ini pada keropok ikan masih belum ada di Malaysia.

Kata kunci: Keropok ikan; kumbang tembakau; Lasioderma serricorne; produk simpanan

INTRODUCTION

Lasioderma serricorne (Fabricius 1792) (Coleoptera: Anobiidae) or cigarette beetle was considered as stored product pests worldwide (Howe 1957; Hill 1990). They have brought serious troubles to the tobacco industry in Japan and the retail pet shops in the USA (Kohno et al. 1983; Roesli et al. 2003). As for Southeast Asia countries such as Philippines and Thailand, these beetles are found responsible for damaging the stored grains such as rice, maize and cassava (Caliboso et al. 1986; Sukprakarn 1986). They are considered to be economically important insect and few methods to control them have been studied (da Silva et al. 2018; Edde 2019). It is common to find *L. serricorne* on dried stored materials such as dried fruits, cocoa beans, cereals and dehydrated plants (Cabrera 2001). However, there is no published record of this beetle thus far as insect pests on dried materials in Malaysia, especially on dried fish crackers.

Dried fish crackers, also known as “keropok ikan” in Malay, is one of the local delicacies in Malaysia. The preparation of the crackers involves the mixing of sago

flour and fresh fish such as silver-stripe round herring (*Spratelloides gracilis*), round scad (*Decapterus punctatus*), golden threadfin bream (*Nemipterus virgatus*) and some others, as key ingredients. The dried fish crackers should be fried in cooking oil according to recipe prior to human consumption. Some locals packed and sealed the raw dried fish crackers into plastic bags before commercializing them to customers. Most of these products are usually homemade. Nevertheless, the selling of these crackers has established a small-scale economy especially for those living in the east coast of Malaysia such as Pahang, Kelantan and Terengganu (Zainal et al. 2010; Mohamed et al. 2015). In Malaysia, all food premises as defined under the Food Act 1983 shall comply with the Food Hygiene Regulations 2009. Therefore, it is utmost important to monitor the food hygiene and the quality of products sold in the local market to ensure safety of the consumers from food-borne diseases. The aim of the present short communication is to report the first finding of *L. serricorne* infestation on dried fish crackers and to highlight further

research on this beetle for better understanding of their biology and distribution in Malaysia.

A packet of dried fish crackers (~150 gm) manufactured in the east coast of Peninsular Malaysia (i.e., Terengganu) was heavily infested by hundreds of dead minute beetles. It was brought to the Parasitology Laboratory at the Institute for Medical Molecular Biotechnology (IMMB), Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh campus for further examination in November 2018. The ingredients of the fish crackers listed by the manufacturer include fish (no specific species mentioned), sago flour, salt, sugar, water and MSG. There was no information regarding the manufacturing date printed on the packet. The packet was purchased before the expiry date. The packet's external and internal surfaces were carefully inspected, and there were no leakage or puncture holes detected on both plastic surfaces.

The dried fish crackers were spread out on white paper towels. The symptom of damages observed include multiple puncture holes, discolouration of the product, and turning the product into powdery forms. The minute beetles were hand-picked and separated from the crackers using applicator sticks and tweezers. The abundance of beetle specimens was then counted, labelled and preserved in 70% ethanol thereafter.

The preserved beetles were examined under a stereomicroscope (Olympus SZ51, Japan) and identified using keys by Klimaszewski & Watt (1997) and Ashworth (1993). The temperature and relative humidity of the laboratory during identification process were 20.9°C and 60% respectively, recorded using indoor data logger (Hobo, USA).

The minute beetles were subsequently identified as *L. serricornes* based on the distinct morphological characteristics (Figure 1). They were identified to the family Anobiidae based on the size of the beetle which is between 2 to 3 mm, and the body colour of light to dark brown (Klimaszewski & Watt 1997). The beetle is also oval-shaped, with the head and prothorax set downward making it appeared humped, convex and hidden from upper view, and the elytra are smooth (Howe 1957; Klein 1986). The key characteristic which differentiated *L. serricornes* from other members of Anobiidae was the serrate antennae with a saw-like appearance and similar thickness from base to tip (Howe 1957). The formula for the tarsal is 5-5-5 and the adult mandibles are triangular in form with two triangle-shaped apical teeth (Klein 1986). From the dried materials examined (Figure 2), approximately 350 cigarette beetles belonged to the same species were collected from a single packet of dried fish crackers.



FIGURE 1. The frontal (left), lateral (centre) and dorsal view (right) of *Lasioderma serricornes* (Coleoptera: Anobiidae) collected from the dried fish crackers sold in a local market in the east coast of Peninsular Malaysia



FIGURE 2. Approximately 350 individuals of *Lasioderma serricornes* (Coleoptera: Anobiidae) were found infesting the dried fish crackers sold in a local market in the east coast of Peninsular Malaysia. The powdery remnants and changed of colour of the dried fish crackers were probably due to the feeding activity of these beetles

Lasioderma serricornes takes approximately 40 to 90 days to develop from eggs into adults depending on the temperature and the food source (Cabrera 2001). At 20°C, the eggs hatch within four weeks while at temperature lower than 18°C, the eggs die within six weeks (Imai & Harada 2006). Among the variety of stored products, cigarette beetles have the highest affinity towards tobacco, followed by cocoa powders and soybean flour (Hori et al. 2011). A study reported that these beetles have better survival rates to adulthoods when living off the Turkish and flue-cured tobacco in comparison to dark air-cured tobaccos (Milne 1963). Another study found that the survival and fecundity rate of *L. serricornes* were the highest on wheat flour in comparison to ground chilli, paprika, cayenne pepper, chewing leaf tobacco, cigar tobacco and commercial insect bait (Mahroof & Phillips 2008). They also feed on most part of plant *Senecio* sp., such as the flowers, fruits and the stem (Retief & Nicholas 1988).

The larva of the cigarette beetles feed on variety of food source mentioned previously while the adult beetles may or may not feed (Minor 1979). However, the quality of food consumed by the larva can be crucial to the longevity and size of the adult (Mahroof & Phillips 2008).

The impact of damages caused by these beetles has led to many studies to control the pest. Among the oldest methods to control the beetles include building closure with controlled humidity, temperature and sterile entry, and fumigation (Retief & Nicholas 1988). Application of low temperature for the storage of tobacco has been applied to disrupt the development of the eggs and larvae of the beetles (Imai & Harada 2006).

This is the first report on the infestation of cigarette beetles inside a packet of dried fish crackers sold in a local market in Malaysia. However, it is still uncertain regarding the route of entry of these beetles in the packet. They could originate from the flour or dried fish used to prepare for the crackers. Previous research has been conducted uncovering these beetles from flour and grains (Cabrera 2001). Due to the small size of the eggs, which is approximately 380 µm long, 200µm wide (Kucerova & Stejskal 2010), they may have been overlooked by the cooks or food handlers when mixing the ingredients. This report is necessary to highlight the importance of hygienic practice during the food preparation process and the use of clean ingredients in the production of fish crackers for human consumption. It is also imperative to monitor the quality of the products even after being packed and retailed. Regular premise inspection from the authorities to ensure the hygiene of the dried fish crackers especially the homemade ones can provide assurance to the consumers. Previous case report identified the larvae of *L. serricorne* caused human canthariasis in infant in Malaysia (Mokhtar et al. 2016) which further increases the need to study cigarette beetle in this country. The infant was suspected to ingest eggs of the beetles from her daily meals such as biscuits and cereals that have been infested with *L. serricorne* (Mokhtar et al. 2016)

Further research on biology of cigarette beetles and their distribution in Malaysia should be initiated in order to manage their population. We hypothesized that there could be more unreported cigarette beetle infestation cases on different sources of dried food materials sold in the local markets in Malaysia. The development of novel and innovative methods to control these beetles are also vital to ensure food hygiene and safety and to reduce economic damages due to massive infestation of these beetles on stored products worldwide.

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