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BRACON HEBETOR SAY, 1836 (HYMENOPTERA: BRACONIDAE: BRACONINAE), A PARASITOID OF STORED RICE IN MALAYSIA

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ABSTRACT

A preliminary monitoring was done at a selected rice storage warehouse which has been infested by insect pests. Many individuals of braconid wasps that were observed during the monitoring process are believed to have the potential as parasitoids of the stored insect product. A species of braconid wasp, *Bracon hebetor* Say has been identified from the warehouse parasitizing *Sitotroga cereanella* Olivier

Keywords: *Bracon hebetor*, Braconidae, biological control, storage pest, rice grain.

ABSTRAK

Satu pemerhatian awalan telah dilakukan di sebuah gudang simpanan beras yang telah diinfestasi oleh serangga perosak. Banyak individu penyengat braconid telah diperhatikan dan dipercayai berpotensi

sebagai parasitoid ke atas serangga perosak simpanan semasa proses pemantauan dijalankan. Satu spesies penyengat braconid, *Bracon hebetor* Say telah berjaya dicamkan berdasarkan ciri morfologinya.

Kata kunci: *Bracon hebetor*, Braconidae, kawalan biologi, perosak simpanan, bijiran beras.

INTRODUCTION

Insect pests of rice grain storagein Malaysia have been recorded since 1985. The insect pests are mainly belongs to the Orders Coleoptera, for example *Rhyzopertha dominica* (Bostrichidae)*, Sitophilus oryzae* and *S. zeamais* (Curculionidae), *Tribolium castaneum* and *T. confusum (*Tenebrionidae), and Lepidoptera *Sitotroga cerealella* (Gelechiidae) (Ahmed et al., 2011; Asmanizar et al., 2012; Hassan et al., 2004; Muda, 1985; Samodra & Ibrahim 2006).

According to Asmanizar et al. (2012) and Wright (1963), the insect pests bring a few of negative effects to the total productions and quality of rice grain storage stocks such as weight loss and grain damaged. The insect pest populations are controlled by sanitation and insecticide applications by implementing fumigation and chemical control up till recently (Herbert 2013, Weinzierl & Higgins 2008). However, the use of the chemicals somehow can impose bad influences to the rice storage due to the continuous intact with the chemical residues (Phillips & Throne 2009), which cause human health problems. Hence, by determining the specific natural biological control agent viz. parasitoid is one of the options in reducing or zero-used of the insecticides.

The usage of parasitoid species has been successfully tested in United State of America for protection of stored maize for example *Theocolax elegans* (Pteromalidae) Westwood (Flinn et al. 2006) and *Bracon* (=*Habrobracon) hebetor* Say for controlling *Plodia interpunctella* Hübner in stored product (Ghimire & Phillips 2010). Furthermore, the identification of insect pest natural enemies is the fundamental step in applying the biological control (Hajek 2004). Therefore, the aim of this study are to identify the parasitoids and to determine their specific hosts.

MATERIALS AND METHODS

Insect monitoring and sampling

Insect monitoring by naked eyes has been done in a selected rice grain stored-product warehouse on 7th March 2013. All the insect pests and parasitoids species have been collected randomly and were brought back to the lab for further identification.

Species identification

The braconid wasp (Braconidae) has been identified by referring the keys to subfamilies by Achterberg (1993) and key to species by Beardsley (1961). Then, the sample has been photographed using Carl Zeiss Image Analyzer, attached with Zeiss AxioCam MRc (version 5.05.10). A list of recorded insect pests in the warehouse has been obtained from the warehouse staff and mentioned in the discussion.

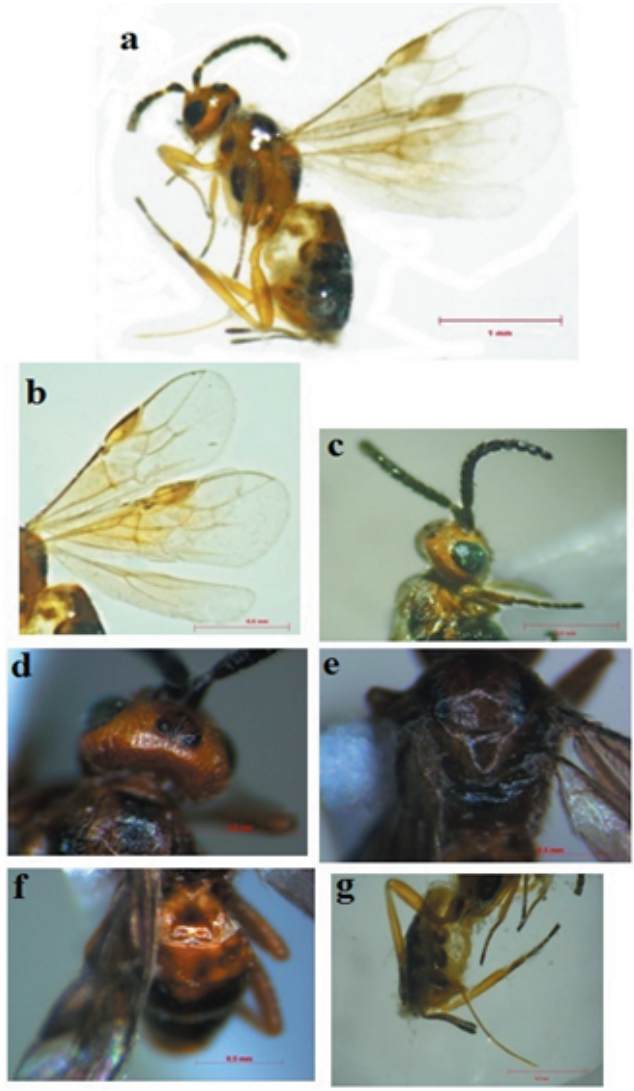
RESULTS AND DISCUSSION

A total of 14 individuals of the braconid wasps have been collected from the warehouse. The wasps has successfully identified belong to the subfamily Braconinae (family Braconidae). The morphological characters of Braconinae as written by Achterberg (1993) are: mesopleuron without wide opening, usually completely flat; length of vein 1-M of hind wing at least 1.5 times vein M+CU and usually more or less widened basally; ventral part of clypeus depressed, forming dorsal part of hypoclypeal depression (Achterberg 1993). The braconid wasp has been identified belong to the species, *Bracon hebetor* Say (Figs 1a-g) as its possessed the following morphological characteristics; second of cubital cell of forewing short, not more than about twice as long as wide; vein 3-SR of fore wing 0.9-1.2 times vein r, rarely up to 1.4 times (Beardsley 1961).

Bracon hebetor Say, 1836 is a cosmopolitanspecies that is well distributed in all prime biogeographic regions (Yu et al. 2005). Its biology as gregarious ectoparasitoid towards the larvae of Lepidoptera infesting stored products has been recorded in Brazil (Magro & Parra 2001), United State (Benson 1973) and in Turkey for flour moth, *Ephestia kuehniella* Zeller (Altuntas et al. 2010).

Within this preliminary monitoring, the origin of the *B. hebetor* could not be clarified, whether it has been brought by chance to Malaysia from the origin exported countries or from the mangrove area surrounding the warehouse. From the study, two assumptions have been proposed; 1) if the parasitoids are from the other countries, it is clear that the parasitoids have been transferred with the egg, larval or pupal stages of the pest and not being detected by the business stakeholders during the packaging process and 2) the parasitoids probably enter the hangar-like warehouse due to the wide opening of the warehouse.

There are six identified insect pests recorded from the studied warehouse namely *Tribolium castaneum* Herbst, *T. confusum* Duval*, Oryzaephilus surinamensis* Linne*, Rhyzopertha dominica* Fabricius*, Sitophilus* sp. Schoenher and *Sitotroga cerealella* Olivier. From the observation, larvae of *S. cerealella* (Angoumois Grain Moth) were scattered outside the rice sacks, but no other insect pests larvae can be found outside the rice sacks. Regarding to Benson (1973), *B. hebetor* was not just been recorded as the parasitoid of Lepidoptera, but specific to the primary parasitoid of the pyralid moth larvae infesting stored grain (Heimpel et al. 1997). Therefore, *S. cerealella* has been assumed as the host for *B. hebetor* because of only S. *cerealella* (moth Lepidoptera) has been found in the warehouse. This assumption needs further investigation for the verification. Besides that, egg of the pest species induced specific chemical cues or pheromone that help in foraging behavior, which give direction to the parasitoid for determining and searching the right host (Fatouos et al. 2008).



Figs. 1a-g. *Bracon hebetor* Say, female; a) habitus, lateral aspect; b) forewing and hindwing; c) antennae and head, lateral aspect; d) head, dorsal aspect; e) mesosoma, dorsal aspect, f) first tergite, dorsal aspect; g) ovipositor, lateral aspect

CONCLUSION

From this monitoring study, the origin country of the *B. hebetor* in Malaysia warehouse rice storage and their relationships with the pest could not be highlighted. Further study is highly necessary to identify the origin of *B. hebetor* and the relationship with the *S. cerealella*. We suggest that the rearing of the host or pests species in the laboratory is the most appropriate task for verifying the pest and parasitoid relationship.

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