International Journal of Agricultural Technology 2017 Vol. 13(7.1): 1191-1197
Available online http://www.ijat-aatsea.com
ISSN 1686-9141

Growth and Development of *Ooencyrtus* sp.

Danarun S. and S. Bumroongsook*

Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

Danarun S. and S. Bumroongsook (2017). Growth and Development of *Ooencyrtus* sp. International Journal of Agricultural Technology 13(7.1): 1191-1197.

Ooencyrtus sp. (Hymenoptera: Encyrtidae) is considered as the important parasitoid of the crepuscular hawkmoth (*Nephele hespera* (F.). Developmental growth of this egg parasitoid was performed under the laboratory conditions (25.68±1.14 ℃, 68% RH) and the results showed that the egg laying period was 22.87 ± 16.39 minutes. The life cycle of *Ooencyrtus* sp. involves 4 stages: egg, larva, pupa and adult. The entire life cycle period from egg to adult emergence was about 15-34 days. The egg was oval, transparent and white colored egg is 0.17±0.02 mm. long and 0.11±0.01 mm wide. The period of incubation was 1 day. The larva of *Ooencyrtus* sp. develop in eggs of crepuscular hawk moth, and it breaths through the egg stalks protruding on the egg shell of its host. (0.26±0.02 mm long). The 1st instar is 0.33±0.06 mm. long and 0.19±0.04 mm wide. The last instar larva was 1.05±0.14 mm long and 0.51±0.07 mm. wide. The larval stage lasted for 1-2 days. Pupa body measurement was 0.86±0.12 mm long and 0.49±0.07 mm wide and this stage takes 6-7 days. Males were observed smaller than females. Antenna with a scape is 0.25±0.04 mm long. *Ooencyrtus* sp. was found widely distributed in the central parts of Thailand.

Keywords: *Ooencyrtus* sp., *Nephele hespera* (F.),

Introduction

Crepuscular hawk moth (*Nephele hespera* (F.) was an insects pest belonging to the order Lepidoptera in the family Sphingidae. They are considered one of the important insect pest of karanda (*Carissa carandas* Linn.; Apocynaceae). The adult is active at night. The caterpillar destroyed the young and old leaves of theirhost plants. If there is a large outbreak, it will cause the plant to stop growth because there are not sufficiently leaves for photosynthesis. From the previous research work, it has been found that there are many natural enemies of the crepuscular hawk moth especially *Ooencytus* sp. (Hymenoptera: Encyrtidae) which has a role for controlling *Nephele hespera* population. Nunta, (2002) reported that the egg parasitoid *Ooencyrtus phongi* (Hymenoptera: Encyrtidae) parasitized eggs of *Tessaratoma papillosa* and

* **Coresponding author:** S. Bumroongsook; **Email:** suvarin.bu@kmitl.ac.th

Ooencyrtus pityocampae was an egg parasitoid of *Brachynema signatum* (Mohammadpour *et al*.,2014). Tunca *et al*. (2015) found *Ooencyrtus pityocampae* Mercet is egg parasitoid of *Philosamia ricini*.

Objectives: The research is to focus on the growth and development of *Ooencytus* sp. including population change and its parasitization in order to evaluate the egg parasitoid potential.

Materials and methods

Growth and Development of the Ooencyrtus sp.

Two pairs of the parasitoids were placed in the petri dish spiked 25% of honey solution as nutritional resource. Eggs of *Nephele hespera* is used for the Ooencyrtus sp egg laying. Growth and development of each parasitoid stage was observed under the microscope (DS-Fi2, Nikon). Each developmental time was recorded, measured and photographed. Adult gender was identified.

Population change, of Ooencyrtus sp. and parasitism

The crepuscular hawk moth's eggs collected from Karanda trees in Ladkrabang district, Bangkok for 1 year. . They were placed in a petri dish (9 cm diameter) for observation on parasitization. Until the eggs were collected. The number of the adult parasitoid wasp and their larvae were recorded. Parasitism percentage was calculated.

Results and Discussion

Growth and development of Ooencyrtus sp.

Egg: The egg is white, oval shape with a long stalk for breathing. This egg stem is attached to the eggshell of the hawk mothand the egg dimension is 0.23-0.30 mm wide (0.26 $\pm$ 0.02 mm in average) and 0.15-0.22 mm in length (0.17 $\pm$ 0.02 mm in average) (Table 1). The incubation period was about 1 day.

Larva: The 1st instar (Fig 1 A-D) was newly hatched from the eggwith a stalk connected to the air for breathingbecause within the host egg is full of fluids The larva was 0.24-0.45 mm in length (0.36 $\pm$ 0.09 mm in average) and 0.23-0.47 mm in body length (0.33 $\pm$ 0.06 mm in average). Width 0.12-0.24 mm average 0.19 $\pm$ 0.04 mm). This larval stage takes about 1 day

The last instar was fully developbefore the pupation. Most parasitoid larvae did not have stalks because inside the egg are empty. of the egg does not contain liquid. This worm can be seen from the eggshell shell of the Red-winged Hawk the stem is 0.27-0.37 mm in length (0.33 ± 0.05 mm in average). The body length is 0.86-1.27 mm (mean 1.05 ± 0.14 mm) and the width was 0.39-0.66 mm (average 0.51 ± 0.07 mm). The developmental time lasted for 1-2 days. Giuseppino, (2013) indicated that the parasitoid of this species had five age groups. There are different lengths in each age.

Prepupa: It is a whiteparasitoid, round body and a lot of fat. It detached from the egg stem. Its body length is 1.55-1.65 mm (mean 1.60 ± 0.07 mm), 1-1.1 mm wide (1.05 ± 0.07 mm in average). It takes about 1 day.

Pupa: The pupa is exarate and black color. (Fig 2 A-D) An antenna and legs are light yellow with a length of 0.67-1.11 mm (average 0.86 ± 0.12 mm) and 0.35-0.64 mm wide(average 0.49 ± 0.07 mm). The pupa takes about 6-7 days.

Adults: The female body is relatively short. The head and the thoraxare black. The ventral part is yellow. with and the thorax. The scutellum is prominent. Onthe middle of long legs, there are four tarsus. The body is 0.47-0.81 mm in length (0.60 ± 0.09 mm in average). The forewing is 0.52-0.90 mm long (average 0.72 ± 0.11 mm) and 0.10-0.18 mm wide (average 0.13 ± 0.02 mm). The hindwing is 0.30-0.60 mm long (an average of 0.45 ± 0.08 mm). The Antennal is divided into three parts: the oblique lines, the sensory part with the length 0.20-0.38 mm (average 0.25 ± 0.04 mm). Female lifespan is 13-31 days old (Fig). Males are slightly smaller than females, with blackcolor. The wingspan is 0.20-0.35 mm (0.26 ± 0.04 mm in average) for a female and 0.40-0.68 mm (0.56 ± 0.10 mm in average) for a male. The wing dimension was described in Table 3. The appearance of the male antennae is distinct from that of the female. It is clearly visible. The males live for 4-19 days old. Klaew klaat and Seua saaat (2005); Mani and Thontadarya (1988). Reported the life cycle of *A. dactylopii* in the Encyrtidae family. Its developmental time was 15 days, the growth stage of the parasite. *A. dactylopii* invaried. (Fig 3 A-B) (Table 2-3).

Table 1. Developmental stages of the *Ooencyrtus* sp.

Stages	Body width (mm)	Body length (mm)	egg stalk length (mm)	Range (day)
egg	0.11±0.01	0.17±0.02	0.26±0.02	1
1 st instar	0.19 ±0.04	8.73±1.81	0.85±0.06	1
5 th instar	0.51±0.07	1.05±0.14	0.33±0.05	1-2
prepupa	1.05±0.07	1.60±0.07	-	1
pupa	0.49±0.07	0.86±0.12	-	6-7
male	-	0.51±0.05	-	4-19
female	-	0.60±0.09	-	13-31

[1]Values are means of thirty replicates ± SD

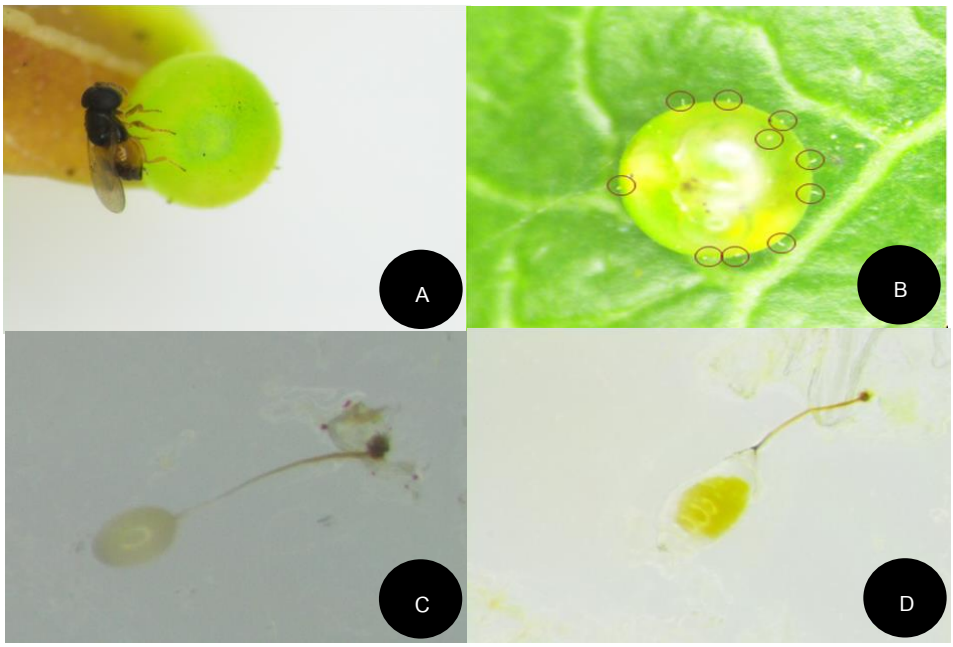

Figure 1. *Ooencyrtus* sp. A: egg deposition B: egg stalk opening; C: an egg with a long stalk D: 1 st instar

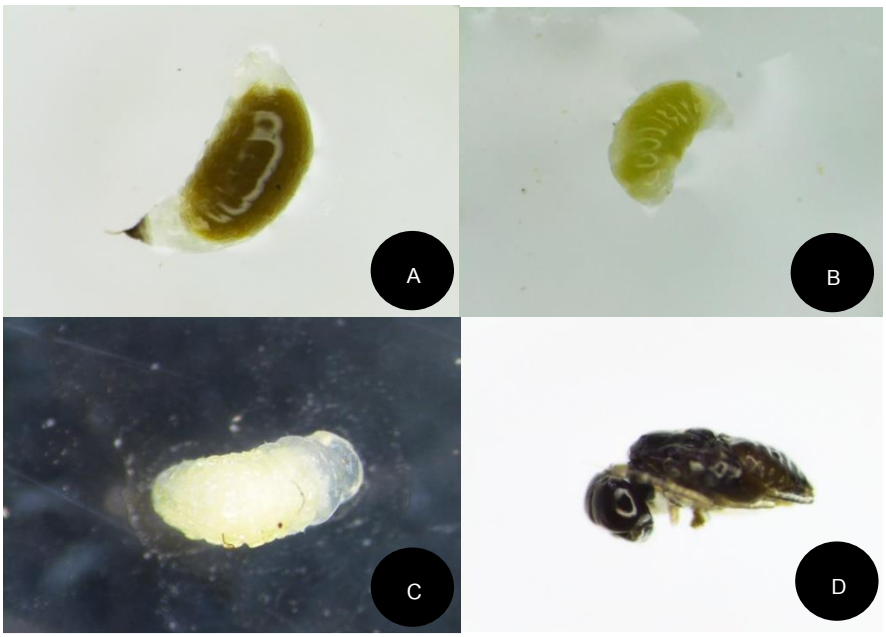

Figure 2. Development of *Ooencyrtus* sp. A: the 5th instar larva (brown color) B: the 5th instar larva (green color) C: prepupa D: pupa

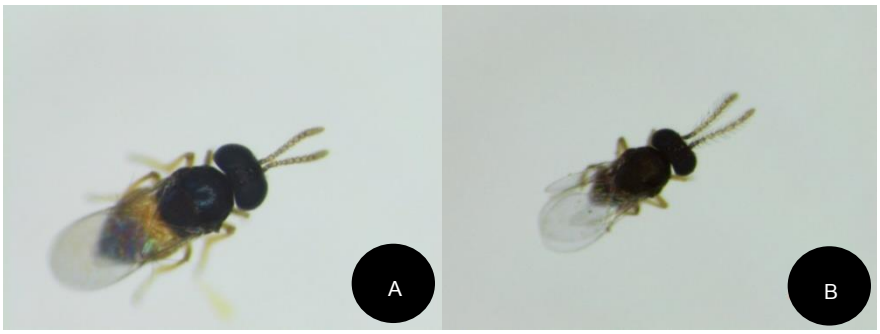

Figure 3. *Ooencyrtus* adult A: female B: male

Table 2. The length of body and antenna in millimeter of the *Ooencyrtus* sp.

Sex	Body length (mm)	Antennal length (mm)
Male	0.51 ±0.05	0.25 ±0.04
Female	0.60 ±0.09	0.34 ±0.03

[1]Values are means of thirty replicates ± SD

Table 3. Sizes[1] in millimeter of fore- and hind- wing of the *Ooencyrtus* sp.

Sex	Fore wing		Hind wing	
	Width	Length	Width	Length
Male	0.26 ±0.04	0.56 ±0.10	0.11 ±0.10	0.39 ±0.06
Female	0.32 ±0.04	0.72 ±0.11	0.13 ±0.02	0.45 ±0.08

[1]Values are means of thirty replicates ± SD

The percentage of egg parasitization in Nephele hespera (F.) in nature.

Ooencyrtus sp. population was associated with the *Nephele hespera* (F.). When the amount of egg of crepuscular hawk moth increased, the more parasitized egg by *Ooencyrtus* sp. were found (Fig 4). The adult and larval parasitoid graph had similar pattern. The adult was observed highest in December and lowest in February. However, the parasitism was found throughout the year.

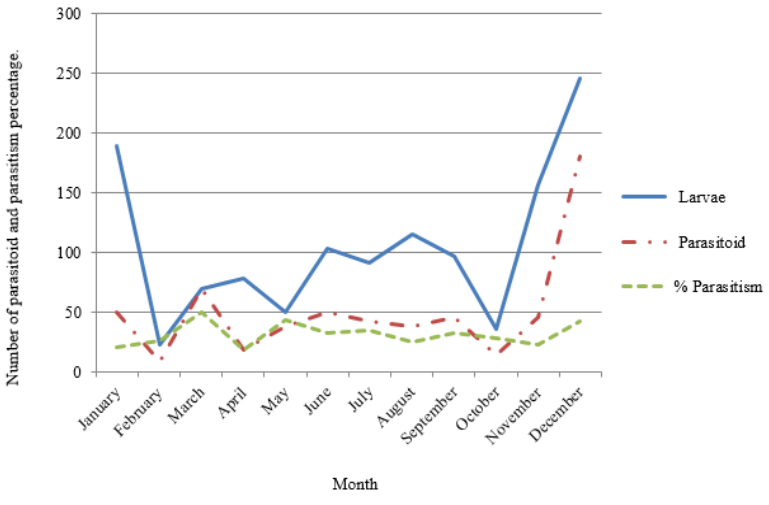

Figure 4. Relationship between number of larval host and egg parasitoid population in 2016

References

Nunta, P. (2002). The natural enemies of IPM. Bang kok. The Agricultural Co-operative Federation of Thailand., LTD.

Mani, M. and Thontadraya, T.S. (1988). Studies on the safety of different pesticides to the grape mealybug natural enemies, *Anagyrus dactylopii* (Howard) and *Scymnus coccivora* Ayyar. Indian Journal of Plant Protection. 16: 205-210.

Mohammadpour, M. Amin, J. and Michaud, P. (2014). Multiparasitism of stink bug eggs: competitive interactions between *Ooencyrtus pityocampae* and *Trissolcus agriope*. International Organization for Biological Control 59:279–286.

Tunca, E. Colombel, A. Ben Soussan, T., Buradino, M. Galio, F. and Tabone, E. (2015). Optimal biological parameters for rearing *Ooencyrtus pityocampae* on the new laboratory host *Philosamia ricini*. Journal of applied entomology. July 1, 2015; accepted: September 30, 2015.

Klaew klaat, A and Seua saaat, V. (2005). Biology of Anagyrus dactylopii (Howard) (Hymenoptera: Encyrtidae), as the important parasite of the spherical mealybug, Nipaecoccus viridis (Newstead) (Homoptera: Pseudococcidae). The 43rd Kasetsart University Annual Conference. 156-162.

(Received: 28 October 2017; accepted: 25 November 2017)