Archives of Agriculture and Environmental Science 4(2): 219-223 (2019)
https://doi.org/10.26832/24566632.2019.0402014

e-ISSN: 2456-6632

This content is available online at AESA

Archives of Agriculture and Environmental Science

Journal homepage: www.aesacademy.org

ORIGINAL RESEARCH ARTICLE

First report on *Apanteles ruidus*, Wilkinson reared on *Hyblaea puera* (Lepidoptera: Hyblaeidae) teak defoliator from India

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ARTICLE HISTORY

Received: 17 May 2019
Revised received: 26 May 2019
Accepted: 06 June 2019

Keywords

Apanteles
Braconidae
Hyblaea puera
Larval parasitoid

ABSTRACT

The present investigation is based on the first report on *Apanteles ruidus*, Wilkinson (Hymenoptera: Braconidae), reported for the first time on teak defoliator *Hyblaea puera* (Lepidoptera: Hyblaeidae) a serious pest of teak *Tectona grandis* (Lamiaceae) from Dehradun, Uttarakhand, India. The investigation was carried out in the adjoining agro-forestry areas of Uttarakhand. The extensive collection of defoliator larvae from various forest trees species for laboratory rearing and emergence of *Apanteles* spp. The wasps were bred from parasitized larvae of *H. puera* in laboratory which were collected from teak forest, Thano range, Dehradun, Uttarakhand. Presently studied species, *A. ruidus* may also be used as biological control agent against teak defoliator *H. puera* after determining its biological control potential, followed by developing their mass multiplication techniques. Thus, *Apanteles* species are vital larval parasitoids of several lepidopterous insect pests of economic importance to agricultural crops, commercial cash crops and forest tree species. Therefore, there are fare chances of its application against the insect pests of forest tree species without adverse effect on biodiversity.

Citation of this article: Yousuf, M. and Ikram, M. (2019). First report on *Apanteles ruidus*, Wilkinson reared on *Hyblaea puera* (Lepidoptera: Hyblaeidae) teak defoliator from India. *Archives of Agriculture and Environmental Science*, 4(2): 219-223, https://dx.doi.org/10.26832/24566632.2019.0402014

INTRODUCTION

Apanteles Foerster is the largest genus of subfamily Microgastrinae (Hymenoptera: Braconidae), comprising the economically important group of larval parasitoids of insect pests. They mainly parasitize the insect pests of agricultural crops, forest tree species, medicinal plants, orchards and cash crops. Some researchers recorded the species of *Apanteles*, parasitizing the host insects including the insect pests of forest tree species. In India, three *Apanteles*: *A. hyblaeae*, *A. malevolus* and *A. subandinus*, have been imported as biocontrol agents of some major lepidopterous pests in agriculture and forestry (Singh, 2004). *Apanteles puera* Wilkinson, *A. malevolus* Wilkinson, *A. hyblaeae* Wilkinson solitary are larval parasitoids of *Hyblaea puera* (Cramer); *Apanteles* (*Protapanteles*) *stauropi* (Viereck); *Apanteles javensis* Rohwer, potential parasitoids of *Parnara conjuncta* (Herrich Schaffer); *Apanteles hyblaeae* Wilkinson, reared from *Hyblaea sanguinea* (Gaede). Recently the researchers (Sathe and Inamdar, 1989; Sumodan and Sevichan, 1989; Sumodan and Narendran, 1990; Sathe and Ingawale, 1995; Kurhade and Nikam, 1997; Pandey *et al*., 2004; Zhdanova, 2011 Dang and Nga, 2012; Mau Dang Trinh *et al*., 2019) have contributed toward the knowledge of Indian *Apanteles*. Therefore, in the present investigation we are presenting the first report on *Apanteles ruidus*, Wilkinson reared on *Hyblaea puera* (Lepidoptera: Hyblaeidae) teak defoliator from India.

MATERIALS AND METHODS

Collection, preservation and card mounting

Taxonomic survey of important forestry and adjoining agro-forestry areas of Uttarakhand was carried out and species belonging to the genus *Apanteles*. Foerster were collected by host rearing method (extensive collection of defoliator larvae from various forest trees species for laboratory rearing and emergence of *Apanteles* spp.). The wasps were bred from

parasitized larvae of *H. puera* in laboratory (Figures 3C and D) which were collected from teak forest, Thano range, Dehradun, Uttarakhand (India). Emerged *Apanteles ruidus* specimens were preserved in 80% alcohol (Figures 3E and F), and then air dried specimens mounted on cards.

Photography

Larvae and adult of *H. puera* were photographed with digital camera (Nikon). *Apanteles* specimens were photographed with automontage Microscope with attached camera. Scanning electron microscopy of specimens was done after drying up to critical point. These were then glued on stubs and gold coated. The SEM photographs were taken with JEOL-JSM-6510LV.

RESULTS AND DISCUSSION

Taxonomy

Apanteles ruidus Wilkinson, 1928: 94. (Figures 1 and 2)

Diagnosis

(*Female*) Length– 2-2.5 mm, colour black, front orbital space half the head width; vertex closely punctate with minute punctures (Figure 2A); interocellar space less than ocello-ocular space.

Thorax

pronotum smooth and shiny; Mesoscutum (Figures 1C and 2D) shining and convex with shallow but contiguous punctures on posterior half, more densely and strongly punctate anteriorly; scutellum (Figure 2D) moderately concave, with large shallow punctures; central groove short, deep, and crenulate. Propodeum with a weak median carina, densely rugulose medially, irregularly transversely rugose laterally. Fore wings (Figure 1B) more than 2× as long as wide; 1st abscissa of radius about equal to width of stigma, little longer than recurrent, which is obviously longer than the apical portion of transverse cubital, stigma shorter than the metacarp.

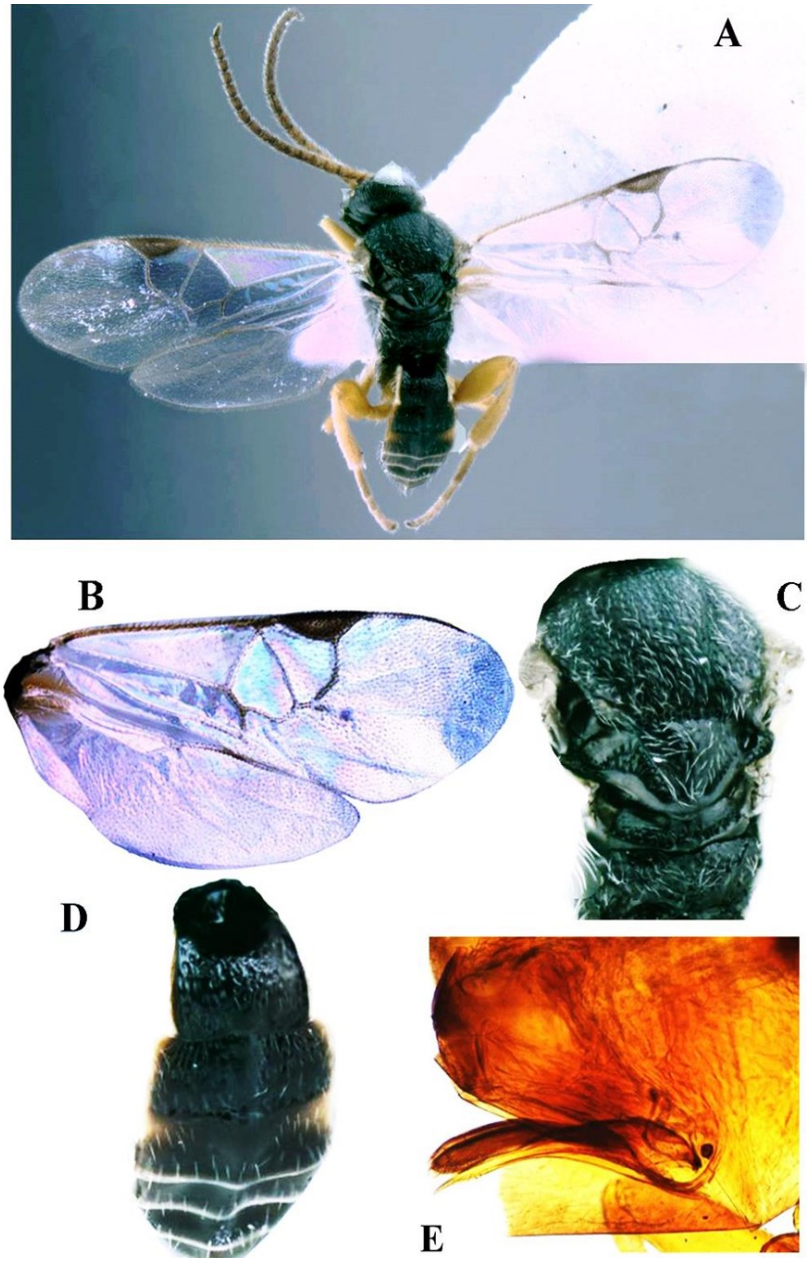

Figure. 1. *A. ruidus (Female: A- Adult; B-Fore and hind wing; C-Mesosoma; D-Metasoma; E- Ovipositor).*

Abdomen

(Figures 1D and 2C) 1st tergite narrowed basally and wide apically, medially as long as wide (apical side) and 2nd and 3rd tergites rugosely sculptured. Ovipositor sheaths (Figure 1E) shorter than ovipositor; ovipositor length about equal to or rather longer than the hind tibial spur.

Cocoons

Gregarious, pale white and oval shaped.

Material examined

30 ♀♀; India: Uttarakhand: Dehradun: Thano; 09.viii.2017; coll. M. Ikram; parasitic on *Hyblaea puera* (Teak defoliator).

Distribution

India: Dehradun (Uttarakhand); Rahatgaon, Hoshangabad (Madhya Pradesh).

Host recorded

Eutectona machaeralis walker, *Hapalia celatalis* walker (Sharma, 1973; Wilkinson 1928).

New record

Hyblaea puera (Teak defoliator).

Biological control is an important component of integrated pest management and in the vast area of the forest, release of parasitoids for the control of key insect pests is a vital component of key insect pest management in forest ecosystem. There are 3 types of important parasitoids: egg parasitoid, larval parasitoids and pupal parasitoids. Many *Trichogramma* spp. are being utilized all over the world for biological control of insect pests and these are being released in millions after their mass multiplication. *Apanteles* spp. is important larval parasitoids. It is required that mass multiplication techniques for *Apanteles* spp. should be standardized. After mass multiplication of selected *Apanteles* spp., these can be released in the field for biological control of key insect pests in forests. Biological control of key forest insect pests by applying larval parasitoids, will be very effective, safe, eco-friendly. Presently studied species, *Apanteles ruidus* may also be utilized as biological control agent against teak defoliator *H. puera* after determining its biological control potential, followed by developing their mass multiplication techniques.

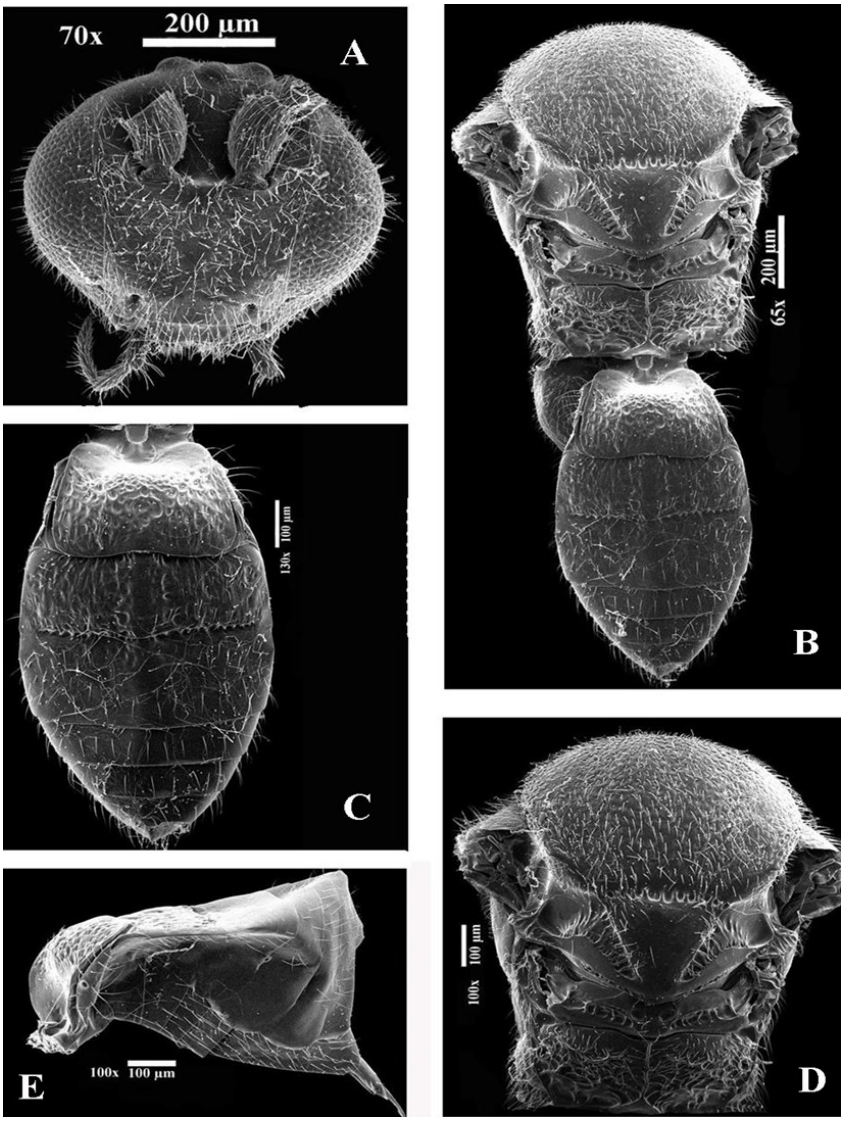

Figure 2. *A. ruidus (SEM photography: A- Head showing front view; B-Meso+Metasoma; C-Metasoma; D-Mesosoma; E- Metasoma and Ovipositor showing lateral view.*

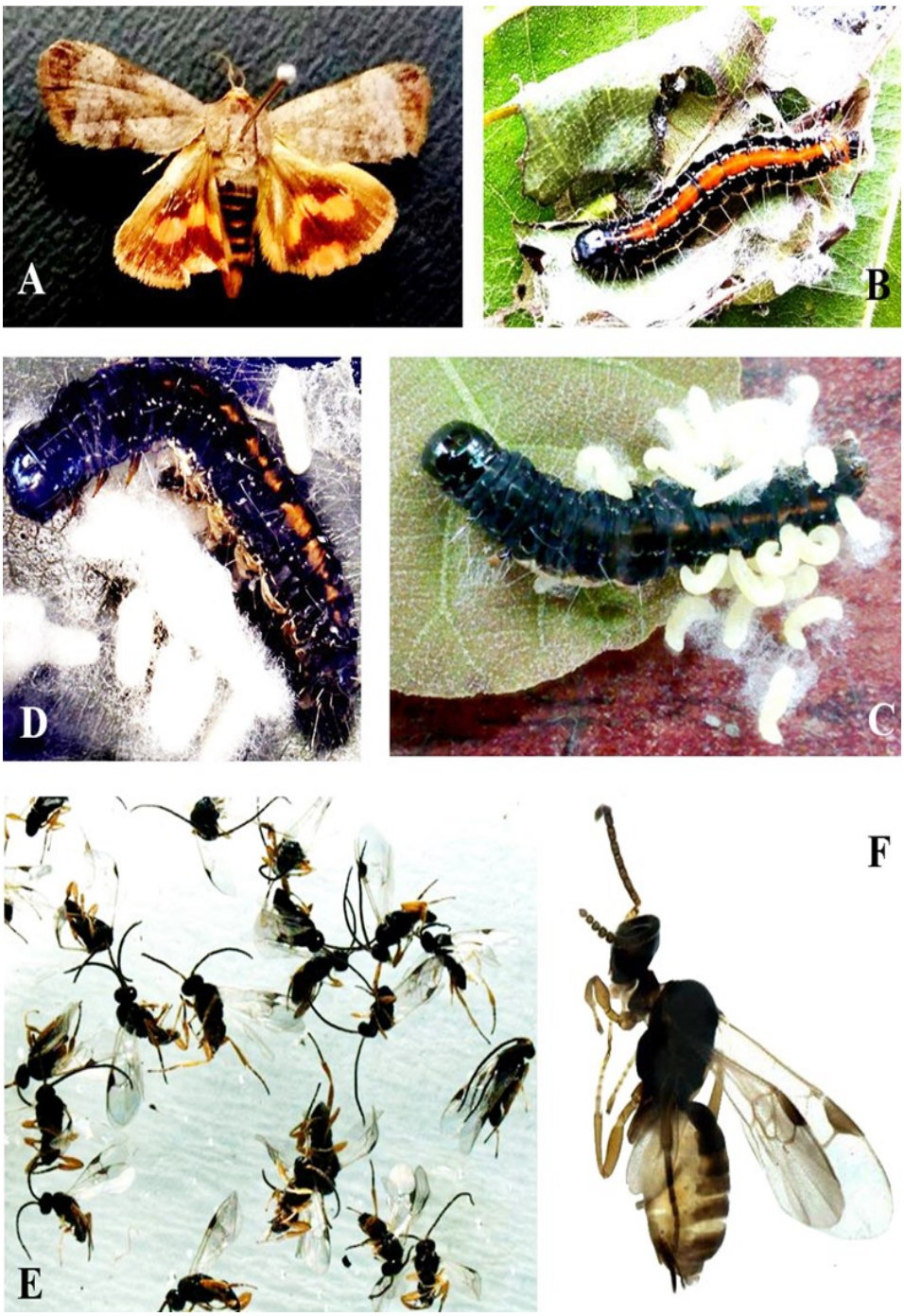

Figure 3. *Emergence of parasitoids (A. ruidus) from host larva, H. puera (Teak defoliator): A- H. puera (Adult); B- Field collected parasitized larva; C-Parasitoid larvae emerging from host larva; D-Dead host larva with parasitoid cocoons; E, F-Emerged parasitoids.*

Conclusion

Apanteles species are important larval parasitoids of several lepidopterous insect pests of economic importance to agricultural crops, commercial cash crops and forest tree species. *Apanteles ruidus* has been reported for the first time as larval parasitoids of *H. puera*. It has given excellent parasitization on *H. puera* and about 30 specimens could be reared and emerged from a single larva. *A. ruidus is* well distributed and well acclimatized in teak forest of Thano range, Dehra Dun (Uttarakhand). *A. ruidus* has selected host infesting forest tree species, hence there are fare chances of its application against the insect pests of forest tree species without adverse effect on biodiversity.

ACKNOWLEDGEMENT

The authors are greatly indebted to the Director, Forest Research Institute, Dehradun for providing necessary research facilities.

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