

**CHELONUS FLAVIPALPIS SZÉPLIGETI, 1896 AND
MIRAX RUFILABRIS HALIDAY, 1833 (HYMENOPTERA:
BRACONIDAE): TWO NEW LARVA-PUPA PARASITOIDS OF
PISTACHIO TWIG BORER *KERMANIA PISTACIELLA* AMSEL,
1964 (LEPIDOPTERA: OINOPHILIDAE) WITH THE
PARASITIZATION RATIOS FROM TURKEY**

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ABSTRACT: The study was carried out to determine the parasitoids and their parasitization ratios on Pistachio twig borer (PTB) *Kermania pistaciella* Amsel (Lepidoptera: Oinophilidae) in pistachio orchards of Central province and Aydınlar counties of Siirt province of southeastern Turkey in 2009. So, the two new parasitoid species *Chelonus flavipalpis* Szépligeti and *Mirax rufilabris* Haliday (Hymenoptera: Braconidae) were determined on *K. pistaciella*. The parasitization ratios of *C. flavipalpis* are more than *M. rufilabris* across study area. The total maximum parasitization ratios were realized as 52 % and 54 % in mid April in Aydınlar and in early March in Central province respectively. It is recorded that the parasitization ratios were reduced at the last times of PTB adult emergence. The study results have importance for the next studies on biological control and integrated pest management (IPM) about PTB.

KEY WORDS: Pistachio, *Kermania pistaciella*, *Chelonus flavipalpis*, *Mirax rufilabris*, new records, Parasitization ratio, Turkey.

Pistachio is an economically important cultivated plant grown easily on heavy soil conditions, and 90% of Turkey's pistachio production is met from the Southeastern Anatolia Region (Anonymous, 2008). There are important pests causing crop losses in the production of pistachio. Pistachio twig borer (PTB) *Kermania pistaciella* Amsel (Lepidoptera: Oinophilidae) is the main pest in all areas of the pistachio production in Iran (Abbaszadeh et. al, 2006, Seiedoleslami, 2006, Samih, & Hatami, 2006; Mehrnejad, 2001; Mehrnejad & Reza Basirat, 2009; Achterberg & Mehrnejad, 2002; Erik Nieukerken van, 2007) and Southeast Anatolia regions (Bolu, 2002; Yanık & Yücel, 2001). PTB is a harmful insect making significant losses since 1970 (Günaydın 1978). It overwinters as larva and it pupates in near a few cm of the exit hole, leaving shoots from the end of February. Significant damage is resulting from the larvae entering into shoots. During this period, growth cone will be damaged because of destruction of the shoots and fruit bunches. So, the shoot growth, development and fruit creation are prevented. The short time entering of the larvae to shoots is of great importance in the control. Previously, two pupa parasitoids of PTB have been identified as *Mirax* sp. and *Microchelonus* sp. (Hymenoptera: Braconidae) by Küçükaslan (1966). The study was carried out to determine the parasitoids and their parasitization ratios on PTB in pistachio orchards of Central and Aydınlar

countries of Siirt province in 2009. Two new larva-pupa parasitoid species *Chelonus flavipalpis* Szépligeti and *Mirax rufilabris* Haliday (Hymenoptera: Braconidae) were determined on *K. pistaciella*.

MATERIALS AND METHODS

Materials of this study are consisted of pistachio, pupae of pistachio twig borer *K. pistaciella*, larvae-pupa parasitoids *C. flavipalpis* and *M. rufilabris*. The study material was supplied as shoots from pistachio orchards of Central and Aydınlar countries of Siirt province. At each pistachio orchard, in each sampling period between the dates 01.03.2009 and 17.05.2009, totally 450 ea pest pupa and soiled shoots, being 5 ea from 10 trees, were brought to the laboratory. The shoots were placed inside the culture box painted a dark black color and the paper bag with the tip of the glass tube. Only the shoot containing the pest pupa were placed into culture boxes. The shoots were cultured to get the parasitoid adults at 25 C temperature and 65 % humidity conditions in climate cabins. The emerged moth and the parasitoids adults were counted and parasitization ratios were recorded. The unopened pupae were examined by opening with the help of thin-tipped needle. These pupas were examined after all the parasitoids came out and it was recorded as to whether they contain any parasitoid or pest pupa. Furthermore, by considering the parasiting feature of the *Chelonus* spp species pests and the ovum phase, 10 ovum samples were taken with culturing from each garden from where shoots were taken, during the ovulation phase of the pest, however no parasitoid outing was obtained. Therefore, it is assumed that the parasitoid parasites the pest in larva stage. The identification of the parasitoid species was conducted by the second author via comparing with the diagnosed samples at St. Petresburg museum.

RESEARCH FINDINGS AND DISCUSSION

Chelonus flavipalpis and *M. rufilabris* species were obtained from PTB pupae. No out parasitoid outing was observed from the pupas. *C. flavipalpis* was known in Georgia, Hungary, Mongolia, Russia, Moldova, Turkey, Ukraine in East and West Palearctic region. Yet as the host species *Parametriotes thea* Kuznetsov and *Sparganothis pilleriana* Denis & Schiffermüller (Lep.: Agonoxenidae, Tortricidae) was known (Yu et al. 2006, Ozgen and Beyarslan, 2010). With this study, *C. flavipalpis* was obtained from PTB pupae in Turkey, also. *M. rufilabris* is registered in 17 countries in western and three countries in eastern palearctic region (Yu et al., 2006). It was found only in Kastamonu in Turkey (Beyarslan, 2009). This species is derived from one host species of Nepticulidae and 51 hosts of Coleophoridae families from Lepidoptera (Van Neuken et al., 2005; Yu et al., 2006). Most likely, both species parasited PTB at the larval stage and left it at the pupal stage. The number of parasitoids and PTB adults emerged from cultured pupae and parasitization ratios are shown in Figure 1 and Figure 2. When the figures are examined, It is seen that parasitization ratios of *C. flavipalpis* have been higher according to *M. rufilabris* in both orchards. The parasitization ratios of *C. flavipalpis* were realized with the highest ratios of 38% on 31/03/2009 in Central county and 32% on 15/04/2009 in Aydınlar county. The maximum parasitization ratios of *C. rufilabris* took place in both orchards with 22% on 07/03/2009 in Central county and on 31/03/2009 in Aydınlar county. The sum of parasitization ratios of both species were held as 54% on 07/03/2009 in the Central County and 52% on 15/04/2009 in the Central

County. In general, it was determined that the parasitization ratios have fallen on the dates progressed. This situation is particularly important in terms of the introduction to overwintering and continuation of next generations of PTB. When the pupae which are not opened were also checked, it was seen that PTB adults could not exit. When the insides of the unopened pupas were examined, it is observed that they all contain pest but not parasitoid. Previously, some other parasitoids of PTB were recorded generally with parasitization ratios. Bolu (2002) determined *Chelonus fissilis* (Tobias, 1985) with an efficiency of 29-57% on PTB. Most of the studies about PTB parasitoids were carried out in Iran. While van Achterberg and Mehrnejad (2002) determined *Chelonus* (*Chelonus*) *kermakiae* and *Centistidea* (*Paracentistidea*) *pistaciella* (Braconidae), Manickavasagam et al. (2008) determined a hyperparasitoid *Cheiloneurus pistaciae* (Encyrtidae) on PTB. Mehrnejad and Basirat (2009) determined the parasitoid complex of PTB. They recorded three species as primer parasitoids, two species as obligate parasitoids and 10 species as facultative hyperparasitoid. *C. (Chelonus) kermakiae* has finding ratio of 85% in this parasitoid complex. As a result, the parasitization ratios of both parasitoids were found hopefully in the areas which are studies realized. Determination of new host of the parasitoids is an important finding. This situation has the importance of biological control of PTB which is controlled chemically difficult. In these areas, it is needed to avoid and minimize chemical control practices for conservation and sustainability of the parasitoid activity. It will be important to investigate the biology and ecology and to increase activity of the parasitoids within the ecosystem for biological control and IPM in the areas of pistachio.

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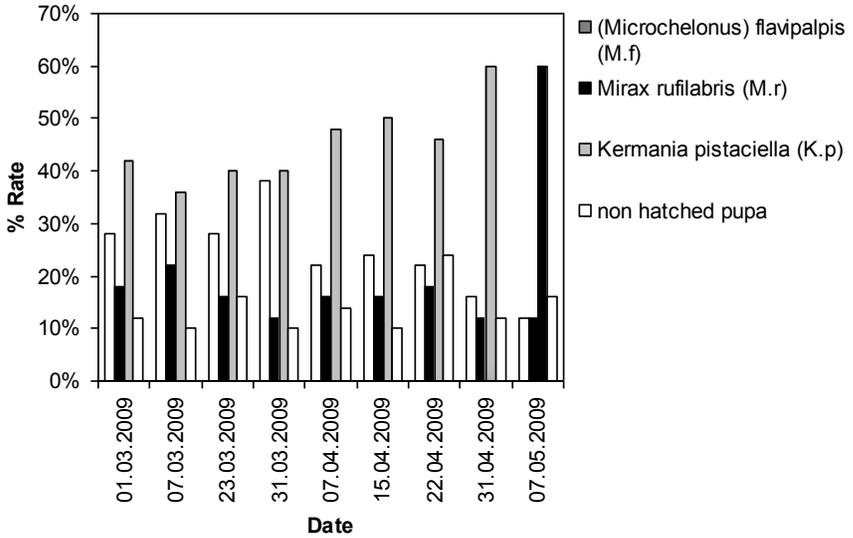


Figure 1. Finding ratios of *Chelonus flavipalpis*, *Mirax rufilabris* and *Kermania pistaciella* with unopened pupae in the pistachio orchard of Central province in Siirt.

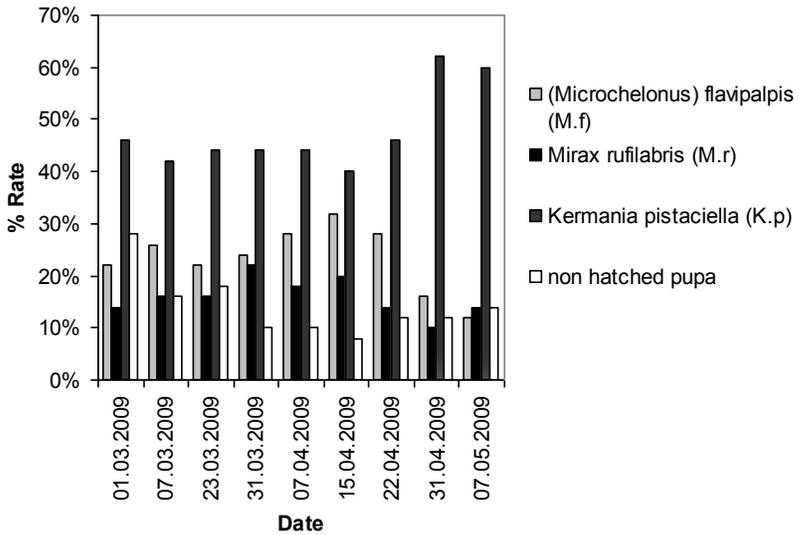


Figure 2. Finding ratios of *Chelonus flavipalpis*, *Mirax rufilabris* and *Kermania pistaciella* with unopened pupae in the pistachio orchard of Aydinlar province in Siirt.