

Morphology and biology of *Melanaspis inopinata* Leonardi (Hemiptera: Diaspididae) on firethorn (*Pyracantha coccinea*) in Turkey

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Abstract: *Melanaspis inopinata* Leonardi (Hemiptera: Diaspididae) is a common pest in Ankara park and gardens. In this study, some morphological and biological aspects of *M. inopinata* were investigated on *Pyracantha coccinea* 2003-2005 in Ankara. It was determined that the species has one generation annually is bisexual producing ovoviviparous young, and overwintered as mated females. An average of 84 ± 15 larvae/female was counted in dissections of 50 gravid adult females. Crawlers appeared from the mid June until late July. The second instars of scale were found from mid July till the end of August in 2004 and 2005. Mortality of first instars was high (average 8.9). The flights of male began at the end of July. The female has the longest biological duration, appearing from mid August until the next June in both years.

Key words: firethorn, *Pyracantha coccinea*, *Melanaspis inopinata*, Ankara.

Introduction

Melanaspis inopinata Leonardi is a Palaearctic species, distributed in Armenia, Egypt, Greece Iran, Israel, Italy, Lebanon, Malta, Sicily, Syria and Turkey. Host plants include *Amygdalus*, *Arbutus*, *Celtis*, *Cercis*, *Crateagus*, *Fraxinus*, *Malus*, *Pistacia*, *Prunus*, *Pyrus*, *Rhamnus* and *Sophora* (Kozar, 1998).

In Turkey, *M. inopinata* is determined on *Acer campestre*, *A. platanoides*, *Aesculus hippocastanum*, *Baubinia* spp., *Chaenomeles japonica*, *C. siliquastrum*, *C. monogyna*, *C. oxyacantha*, *Cydonia oblonga* F. *excelsior*, *Gladitchia* sp., *Jasminium fruticans*, *Prunus avium*, *P. dulcis*, *P. comminus* *P. mahaleb*, *Pyracantha coccinea*, *Rhamnus rodope* *Syringa vulgaris*, *Ulmus campestre* in Afyon, Ankara, Antalya, Aydýn, Balýkesir, Çanakkale, Denizli, Izmir, Kýrýkkale, Muęla and Uşak (Bodenheimer, 1949; Aysu, 1950; Alkan, 1963; Ulu *et al.* 1972; Çobanoęlu & Düzgünes, 1986; Erler *et al.*, 1996; Ülgentürk & Toros, 1996). It is harmful and common in Ankara park and garden plants (Bodenheimer, 1949; Ülgentürk & Toros, 1996; Ülgentürk & Dolar, 2002). Although *M. inopinata* is a pest on *Pistacia vera* in Greece and Iran (Katsoyannos & Stathas, 1997), there is only one record on this host in Çanakkale and pest status is unclear in Turkey (Yaşar, 1995). This pest is common and harmful on trees in parks and gardens in Ankara (Ülgentürk & Toros, 1996; Ülgentürk & Dolar, 2002). It is located on the trunk, branches, and leafstalk of host plants. It is hard to recognize them on plants due to their cryptic colors of scale cover. Firethorn (*Pyracantha coccinea* M. Roemer (Rosaceae)) is a common and preferred ornamental plant in Ankara. During the survey in 2000-2002, *M. inopinata* was found to be a serious pest of firethorn.

Because the biology of *M. inopinata* is not well known in Turkey, this study was initiated to determine the morphological and biological stages, number of generations, overwintering stage, number of eggs, and distribution of *M. inopinata* on firethorn in park and gardens in Ankara, Turkey.

Materials and methods

Biological assessments were concluded from weekly collections of *M. inopinata* infested samples from four firethorn trees in Hacý Elmas of park in Keçiören, Ankara, from November 2003- November 2005. A total of 20 samples from 10 cm infested shoots at four directions

and the central part of four firethor were collected, labeled and placed in containers, and transported to laboratory and examined under the stereomicroscope in the laboratory. The number of live, parasitized individuals and growth stage of all *M. inopinata* specimens were counted. Slides were made using the methods outlined by Kosztarab and Kozár (1988).

To determine oviposition and egg number within the body, 50 gravid adult females were selected randomly and dissected under the microscope in the laboratory.

To assess the distribution of *M. inopinata*, in different parts of in Ankara located in about 100 parks and gardens were randomly surveyed twice weekly between April 2004 and Nowember 2005. Randomly selected plants were investigated visually and infested plants were recorded. These plants were checked in terms of the natural enemies of *M. inopinata*. Meteorological data were provided by the Ankara Station of the National Meteorological Service. *M. inopinata* were kept at the department of Plant Protection, Faculty of Agriculture, Ankara University.

Results and discussion

Crawlers of *M. inopinata* are oval, pinkish brown. It is 43.8 ± 8.15 μm long and 31.2 ± 6.56 μm wide. Exuvia is brown with white cup and circular. The bodies of slide mounted specimens are oval, entirely membranous except for appendages and lobes on the pygidial margin. L_1 is well developed, notched on outer sides, and L_2 is small. The widest part of the body is thorax segments, and is narrowed at posterior end. Antennae are 5 segmented, fifth segment with 7 setae being the longest and annulate. There are 8-shaped ducts located on the head near the eyes and on submedian of mesothorax. No spiracles pores, legs are normally 5 segmented, the tarsus longer than the tibia. Each tarsus and claws have two not knobbed digitules. First instars of *M. inopinata* possess a ventral marginal duct on each of abdominal segments from 1 to 8.

The second instar females similar in appearance, but has fewer macro and microducts compared to adult female. The second instar female is 67.8 ± 13 (48-88) μm long and 60 ± 10.78 (36-80) μm wide. It is circular, pinkish, derm is membranous, pygidium is chitinous and darker than body. Antennae is reduced, has one setae, legs and spiracular disc pores are absent. L_1 , L_2 and L_3 are well developed. Scale of second instars male is narrower and more elongated than II. instar female. It is dark, thick and ash-like in color. This instar has several macroduct on the thorax and abdomen segments. The body is 28 ± 0.1 (26-28) μm long and 21 ± 0 (20-21) μm wide. Between the anterior spiracle and Clypeolabral shield there is one macro duct on each side, and margin of abdomen and the pygidium have tubular ducts. Pupae are 113.45 ± 8 (96-120) μm long, 69.45 ± 12 (48-80) μm wide. The adult male is 112 ± 3.2 (108-116) μm long and width 40 ± 0 (40-40) μm wide. The body is black, it has eleven antennal segments, and wings are gray. End of abdomen has two setae each side.

The samples collected from September 2003 to May 2004 were immature females. The embryos were observed in the female's body after May 3rd, 2004. The average temperature was 15.8°C with 57.2% RH. First crawlers were observed (one mount later) on 18 June. *M. inopinata* is ovoviviparous. The average number of embryos was 84 ± 15 (57-120). Katsoyannos & Stathas (1997) counted 79 ± 16 larvae in dissected female at the late stage of ovulations on the pistachio trees in Greece.

Crawlers were seen for the first time on June 11st and a total of 179 crawlers were counted on June 18th as the highest population. At that time, temperature was 20°C with 57.4% RH. The crawlers continued to emerge to the end of July 5th. The first instars that

had settled on the branches were detected from mid June to mid July (18.7.2004). The number of dead first instars reaches its maximum on July 12th with an average of 13.9. Second instars were found from mid July (19 July) to the end of August. Pupae were found in August (2 to 30 August). Males emerged in August 2004 and August 2005, and this lasted two weeks (Fig. 1) for both periods. Adult females were observed from August 2004 to June 2005 (Fig. 1). The highest number of adult females was counted on September 27 with an average of 4.45. This study indicates that *M. inopinata* has one generation in a year, and overwintered as fertilized female.

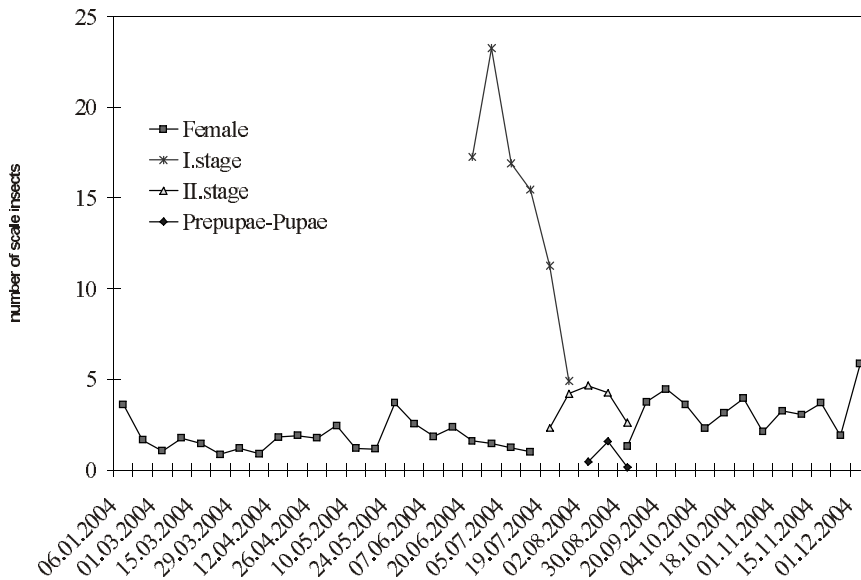


Figure 1. Population density of *Melanaspis inopinata* Leonardi in 2004.

In 2005, crawlers were detected for the first time on June 13th (av. 3.45). The number of crawlers reached to average of 8.5 on June 21st. Mortality of first instar was highest during the first week of July (average of 4.9). Second instars were observed between mid June and mid July. Population of second instars was relatively lower than first instars due to high mortality of first stage (Fig. 2). In the first and second stages, no parasitism or predator activity was observed on the plants. This also helps to explain why the high mortality in first and second instars is not related to any parasitizing or predator activity. However, the predators *M. inopinata*; *Rhyzobius lophanthae* (Blaisdell) (Coleoptera: Coccinellidae), *Cybocephalus fodori-minor* Endrödy-Younga (Coleoptera: Cybocephalidae), *Lestodiplosis aonidiellae* Harris, *Cheletogenes ornatus* (Canestrini & Fanzago) (Acarina: Cheyletidae) and the parasitoids *Aberus celsus* (Walker), *Coccophagoides moeris* (Walker) (Hymenoptera: Aphelinidae) are reported in Antalya by Erler and Tunç (2001). The sex ratio of *M. inopinata* was 22% ♂ : 78% ♀ on *P. coccinea* in Ankara, Turkey. Our surveys in Ankara resulted in a finding that 58% of 94 parks in Ankara were infected by *M. inopinata* whose reproduction was bisexual and ovoviviparous. The results of this study also suggest that the understanding of the biology of *M. inopinata* may help to design methods to control populations of this species in Parks in Ankara.

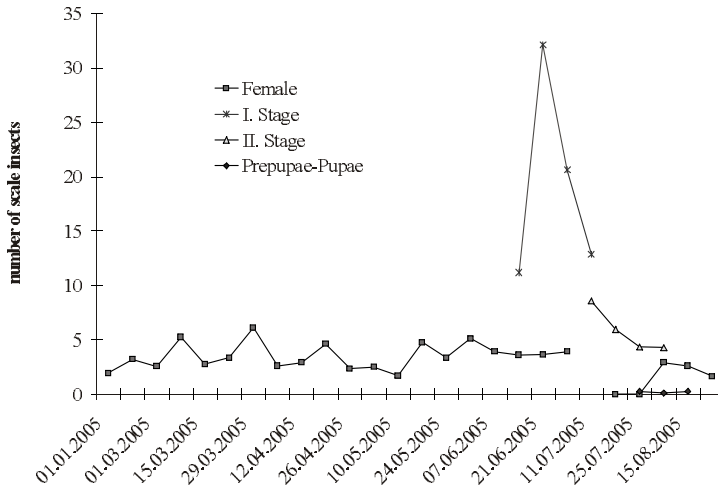


Figure 2. Population density of *Melanaspis inopinata* Leonardi in 2005.

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