

Orijinal araştırma (Original article)

**New Parasitoids Records of *Eulecanium rugulosum*
(Archangelskaya, 1937)
(Hemiptera: Sternorrhyncha: Coccoidea: Coccidae) for
Diyarbakır**

Halil BOLU^{1*}

**Diyarbakır için *Eulecanium rugulosum*'un (Archangelskaya, 1937)
(Hemiptera: Sternorrhyncha: Coccoidea: Coccidae) yeni kayıt
parazitoidleri**

Abstract: This study was carried out in Diyarbakır, Turkey in 2014 on parasitoids of the coccid, *Eulecanium rugulosum* (Archangelskaya, 1937) (Hemiptera: Sternorrhyncha: Coccoidea: Coccidae), infesting the pistachio tree, *Pistacia vera* Linnaeus (Sapindales: Anacardiaceae). During this study, three parasitoid species, *Blastothrix brittanica* Girault 1917, *Blastothrix longipennis* Howard, 1881 and *Blastothrix sericea* Dalman, 1820 (Hymenoptera: Encyrtidae: Encyrtinae), were collected. These are the first reports from Diyarbakır of the association between these parasitoids and *E. rugulosum*.

Key words: *Eulecanium rugulosum*, *Blastothrix brittanica*, *B. longipennis*, *B. sericea*, new record, Diyarbakır

Özet: Bu çalışma, *Eulecanium rugulosum* (Archangelskaya, 1937) (Hemiptera: Sternorrhyncha: Coccoidea: Coccidae) ile bulaşık Antepfıstığı ağaçlarında (*Pistacia vera* Linnaeus) 2014-2015 yılları arasında Diyarbakır ilinde yürütülmüştür. Çalışma sonucunda zararlıdan 3 parazitoid türü elde edilmiştir. Bu türler: *Blastothrix brittanica* Girault 1917; *Blastothrix longipennis* Howard, 1881 ve *Blastothrix sericea* Dalman, 1820 (Hymenoptera: Encyrtidae: Encyrtinae) olarak belirlenmiştir. Bu parazitoid türleri Diyarbakır için ilk kayıt niteliğindedir.

Anahtar sözcükler: *Eulecanium rugulosum*, *Blastothrix brittanica*, *B. longipennis*, *B. sericea*, yeni kayıt, Diyarbakır

¹ Dicle Üniversitesi, Ziraat Fakültesi, Bitki Koruma Bölümü-21280 Diyarbakır

*Sorumlu yazar (Corresponding author) e-mail: besni@dicle.edu.tr, ORCID ID: 0000-0001-5488-0056

Alınış (Recieved): 09.07.2019

Kabul edilmiş (Accepted): 21.11.2019

Introduction

The genus *Pistacia* Linnaeus (Anacardiaceae) is mainly a subtropical genus comprising some 11 species of wind pollinated deciduous and dioecious trees and shrubs. Geographically, the largest concentration of *Pistacia* species is found in West Asia and in the Mediterranean region (Zohary, 1995; Tous & Ferguson, 1996). The pistachio, *Pistacia vera* Linnaeus, originated in Asia Minor, in the northern part of Afghanistan, but has largely spread throughout the Mediterranean and the Middle East (Shrestha, 1995).

Pistachio is one of the most important economic crops in Turkey, with about 43,000 ha of plantations, mostly in Adıyaman, Batman, Gaziantep, Diyarbakır, Kilis, Mardin, Siirt and Şanlıurfa province in the southern Anatolia region of the country (TUİK, 2019). At present, Iran is ranked first in the world in terms of pistachio nut production, followed by the USA and Turkey (FAO, 2016).

Coccidae (soft scale insects) is the third largest family after the Diaspididae (armoured scale insects) and Pseudococcidae (mealybugs) (Ben-Dov et al, 2009) and they are probably more diverse in the tropics and subtropics (Hodgson, 1994). Like other scale insects, the soft scales are sexually dimorphic, with apterous adult females; pedomorphic; and mostly phloem-sucking, plant parasites. Some species are important pests in broad scale agriculture, horticulture, ornamental plants and forestry (Ben-Dov, 1993).

As a result of the surveys carried out in order to determine Coccoidea species in pistachios in Southeastern Anatolia, 4 species were determined. These species are: *Anapulvinaria pistaciae* (Bodenheimer, 1926), *Eulecanium rugulosum* (Archangelskaya, 1937), *Lepidosaphes* (= *Pistaciaspis*) *pistaciae* Archangelskaya, 1930, *Suturaspis pistaciae* (Lindinger, 1906) (Çelik, 1983; Bolu, 2002; Bolu & Uygun, 2003; Özgen & Karsavuran, 2011; Şimşek & Bolu, 2017).

There are more than 1,270 described species of Encyrtidae in the Palaearctic Region (Yasnosh & Japoshvili, 1999; Japoshvili, 2007; Japoshvili & Karaca, 2003; Japoshvili & Noyes, 2005). This family is the most species rich group of parasitoids attacking scale and psyllid insects. Members of the family are important in biological control. More than 400 encyrtid species have been collected from various crop pests (Japoshvili & Noyes, 2006).

The aim of this study was to determine the natural enemies of the harmful soft scale insect *Eulecanium rugulosum* on *Pistacia vera* trees in Diyarbakır, Turkey.

Material and Methods

Eulecanium rugulosum samples were collected from 5 sites in Diyarbakır in south-eastern Turkey in 2014. Specimens were taken from both wild and cultivated plants during irregular surveys carried out in the spring and summer seasons of the one-year study. Each shoots sample was put into a plastic bag and taken to the laboratory for examination (Figure 1).

To collect the emerged adult parasitoids, the shoots were placed in mesh covered containers in climate controlled cabins at 25 °C and 65% humidity. The emerged adults were counted and recorded.



Figure 1. Shoots of Pistachio trees infested with adult females of the coccid *Eulecanium rugulosum*

Results and Discussion

As a result of this study, three parasitoids species *Blastothrix brittanica* Girault 1917; *Blastothrix longipennis* Howard, 1881 and *Blastothrix sericea* Dalman, 1820 (Hymenoptera: Encyrtidae: Encyrtinae) were obtained. The parasitoids of *E. rugulosum*: *Blastothrix brittanica* Girault, 1917; *Blastothrix longipennis* Howard, 1881 and *Blastothrix sericea* Dalman, 1820 are the first records on *E. rugulosum* for Diyarbakır.

***Eulecanium rugulosum* (Archangelskaya, 1937) (Hemiptera: Sternorrhyncha: Coccoidea: Coccidae)**

Distribution in World: Kazakhstan, Tajikistan (=Tadzhikistan), Uzbekistan, Turkmenistan, Turkey, Iran, Armenia, Kyrgyzstan (=Kirgizia) (Anonymous, 2016a)

Distribution in Turkey: Gaziantep (Çelik, 1983); Southeastern Anatolia Region (Bolu, 2002; Bolu & Uygun, 2003); Siirt (Bolu, 2002; Bolu & Uygun, 2003); Şanlıurfa (Yanık & Yücel, 2001; Bolu, 2002; Bolu & Uygun, 2003); Mediterranean region, (Kaydan et al, 2007); Diyarbakır (Şimşek & Bolu, 2017).

Host plant: *Pistacia vera* Linnaeus (Çelik, 1983; Bolu, 2002), *P. khinjuk* Stocks (Bolu, 2002), Peach (*Prunus persica* Linnaeus) (Kaydan et al, 2007).

Material examined: Diyarbakır (37° 53'N, 40° 16'E, at altitude of about 669 m)

Recorded Parasitoids in Turkey: *Encyrtus* sp., *Metaphycus* sp., *Micropterys lunatus* (Dalman, 1820), *Encyrtus suctellata* (Swed.) (Hymenoptera: Encyrtidae); *Caecophagus scutellaris* (Dalman, 1826) (Hymenoptera: Aphelinidae), *Pachyneuron concolor* (Forster, 1841) (Hymenoptera: Pteromalidae), *Tetrastichus* sp. (Hymenoptera: Eulophidae) ve *Metaphycus dispar* Mercet, 1925 (Hymenoptera: Phelinidae) (Çelik, 1983; Bolu & Uygun, 2003).

Recorded Parasitoids in World: *Blastothrix hungarica* Erdos, 1959, *Blastothrix scenographica* Sugonjaev, 1964, *B. sericea*, *Cheiloneurus claviger* Thomson, 1876, *Encyrtus infidus* (Rossi, 1790), *Leptomastix flava* Mercet, 1921, *Metaphycus melanostomatus* Timberlake, 1916, *M. turanicus* (Sugonjaev, 1965), *Micropterys intermedius* Sugonjaev, 1965, *Micropterys praedator* Sugonjaev, 1965 (Hymenoptera: Encyrtidae); *Aprostocetus trjapitzini* (Kostjukov, 1976), *Tetrastichus turanicus* Kostjukov, 1976 (Hymenoptera: Eulophidae); *Eurytoma iranica* Narendran and Lotfalizadeh, 1999 (Hymenoptera: Eurytomidae) (Anonymous, 2016b).

Parasitoids

Blastothrix brittanica Girault, 1917; *Blastothrix longipennis* Howard, 1881 and *Blastothrix sericea* Dalman, 1820 (Hymenoptera: Encyrtidae: Encyrtinae)

Blastothrix brittanica Girault 1917

Material examined: 15♀♀, 4♂♂ (Multiple samples) Locality: Diyarbakır (37°53'N, 40°16'E, at altitude of about 669 m).

Recorded hosts: *Eulecanium* sp. *E. ciliatum*, *E. coryli*, *E. douglasi*, *E. kuwanai*, *E. tiliae*, *Lecanium tiliae*, *Parthenolecanium corni*, *P. persicae* (Hemiptera: Sternorrhyncha: Coccidae) (Anonymous, 2016b)

New record host in Diyarbakır: In the present study *Eulecanium rugulosum* was recorded as a new host of *Blastothrix brittanica* for Diyarbakır.

Distribution: Armenia: Japoshvili & Noyes (2005), Trjapitzin (1978-1989); Azerbaijan: Japoshvili & Noyes (2005); Belarus: Trjapitzin (1989); Canada: Noyes & Hayat (1994), Trjapitzin (1989); Peoples' Republic of China: Xu & Shi (1996), Xu & Huang (2004), Zhang & Huang (2004); Germany: Hoffmann & Schmutterer (2003), Ulrich (1999); Europe: Trjapitzin (1978); United Kingdom: Boucek & Graham (1978), Girault (1917), Girault (1920); Georgia: Japoshvili & Karaca (2002), Japoshvili & Noyes (2005); Japoshvili (2000); Iran: Fallahzadeh & Japoshvili (2010), Lotfalizadeh (2010); Kazakhstan: Trjapitzin (1978); Moldova: Trjapitzin (1989); Mongolia: Trjapitzin (1978-1989); Netherlands: Gijswijt (2003); Pakistan: Hayat (1986), Trjapitzin (1989); Poland: Lagowska (1994); Russia: Herting (1972), Sugonjaev (1960), Trjapitzin (1978-1989); USSR: Trjapitzin (1978); United States of America: Trjapitzin (1989).

***Blastothrix longipennis* Howard, 1881**

Material examined: 5♀♀, 8♂♂ Locality: Diyarbakır (37°53'N, 40°16'E, at altitude of about 669 m).

Recorded hosts: *Brevicoryne brassicae* (Linnaeus, 1758) (Hemiptera: Aphididae) (Peck, 1963); *Eulecanium cerasorum* (Cockerell, 1900) (Herting, 1972); *Eulecanium corni* (Bouché, 1844) (Boucek, 1961; Herting, 1972; Konov, 1965; Sugonjaev, 1963); *Eulecanium coryli* (Linnaeus, 1758) (Herting, 1972; Noyes, 2004), *Eulecanium fletcheri* King, 1902 (Herting, 1972), *Eulecanium tiliae* (Linnaeus, 1758) (Noyes, 2004), *Lecanium* sp. (Peck, 1963; Noyes, 2004); *Lecanium cerasorum* Cockerell, 1900 (Peck, 1963); *Parthenolecanium fletcheri* (Cockerell, 1893) (Noyes, 2004); *Parthenolecanium pomeranicum* (Kawecki, 1954) (Higashiura & Tadauchi, 1995); *Parthenolecanium pruinosum* (Coquillett, 1891) (Noyes, 2004); *Parthenolecanium quercifex* (Fitch, 1859) (Fusu, 2001); *Parthenolecanium rufulum* (Cockerell, 1903) (Fusu, 2001; Japoshvili & Noyes, 2005); *Pulvinaria regalis* Canard, 1968 (Noyes, 2004).

New record host in Diyarbakır: In the present study *Eulecanium rugulosum* was recorded as a new host of *Blastothrix longipennis* for Diyarbakır.

Distribution: Armenia: Japoshvili & Noyes (2005), Moglan (2000); Azerbaijan: Japoshvili & Noyes (2005); Bulgaria: Konov 1965; Tsalev 1965; Moglan (2000); Trjapitzin (1989); Canada: Peck (1963); Gordh (1979); Trjapitzin (1989); Noyes (2004); Caucasus: Sugonjaev (1963); Peoples' Republic of China: Shi (1990), Shi et al, (1995) Xu & Huang (2004); Zhang & Huang (2004); Czechoslovakia: Moglan (2000); Trjapitzin (1989); Peck (1963); Germany: Peck (1963); Trjapitzin (1989); Hoffmann & Schmutterer (2003); Europe: Blahutiak (1984); Trjapitzin (1978); France: Trjapitzin (1989); United Kingdom: Peck (1963); Trjapitzin (1989); Noyes (2004); Georgia: Japoshvili & Karaca (2002); Japoshvili & Noyes (2005); Japoshvili (2000); Hungary: Moglan (2000); Trjapitzin (1989); Italy: Noyes (2004); Kirgizia: Trjapitzin (1989); Kazakhstan: Trjapitzin (1978-1989); Moldova: Trjapitzin (1989); Moglan (2000); Poland: Trjapitzin (1989); Moglan (2000); Russia: Herting (1972), Sugonjaev (1963); Trjapitzin (1978-1989); Moglan (2000); Turkey: Öncüer (1991), Ülgentürk (2001).

***Blastothrix sericea* Dalman, 1820**

Material examined: 2♀♀, Locality: Diyarbakır (37°53'N, 40°16'E, at altitude of about 669 m).

Recorded hosts: Coccidae: *Anapulvinaria pistaciae*, *Ericerus pela* (Chavannes, 1848), *Eulecanium* sp., *Eulecanium ciliatum* (Douglas, 1891), *Eulecanium rugulosum*, *Parthenolecanium* sp.; Diaspididae: *Aulacaspis rosae* (Bouché, 1833); Kermesidae: *Kermes* sp., *Kermes pubescens* Bogue, 1898, *Kermococcus quercus* Henriksen, 1921; Pseudococcidae: *Phenacoccus acericola* King, 1902 (Anonymous, 2016c).

New record host in Diyarbakır: In the present study *Eulecanium rugulosum* was recorded as a new host of *Blastothrix sericea* for Diyarbakır.

Distribution: Canada: Gordh (1979); Herting (1972); Peck (1963); Croatia: Boucek (1977); Czechoslovakia: Thompson (1955); Germany: Herting (1972); Hoffmann & Schmutterer (2003); Thompson (1955); Spain: Peck (1963); Trjapitzin (1989); Europe: Hoffmann & Schmutterer (2003); Thompson (1955); Trjapitzin (1978); France: Herting (1972); United Kingdom: Herting (1972); Thompson (1955); Trjapitzin (1989); Greece: Canard (1980); Georgia: Japoshvili & Noyes (2005); Japoshvili (2000); Hungary: Herting (1972); Trjapitzin (1989); India: Hayat (1986); Ireland (north and south): O'Connor *et al.* (2000); Iran: Fallahzadeh & Japoshvili (2010); Italy: Trjapitzin (1989); Nearctic: Peck (1963); Pakistan: Hayat (1986); Poland: Herting (1972); Trjapitzin (1989); Romania: Botoc (1972); Russia: Trjapitzin (1978-1989); Serbia: Boucek (1977); USSR: Herting (1972), Tudor (1982); United States of America: Trjapitzin (1989); Sweden: Peck (1963), Trjapitzin (1989); Turkey: Georgia: Japoshvili & Noyes (2005), Öncüer (1991); Ukraine: Herting (1972); United States of America: Herting (1972), Peck (1963); Thompson (1955), Tudor (1982); Yugoslavia (pre 1991): Thompson (1955); Trjapitzin (1989).

The aim of this study was to determine the natural enemies of the harmful *Eulecanium rugulosum* on *Pistacia vera* trees in Diyarbakır.

Acknowledgments

The author is thankful to the taxonomy expert for the identification of Dr. George Japoshvili (Institute of Entomology Agricultural University of Georgia-Georgia) and Dr. Lerzan Erkılıç (Biological Agriculture Consulting and Engineering Services Company).

References

- Anonymous, 2016a. Global Biodiversity Information Facility. <http://www.gbif.org/species/110088376> (Last update, 15.03.2019).
- Anonymous, 2016b. Universal Chalcidoidea Database. The Trustees of the Natural History Museum, London, <http://www.nhm.ac.uk/our-science/data/chalcidoids/database/detail>. (Last update, 17.03.2019).
- Anonymous, 2016c. Universal Chalcidoidea Database. The Trustees of the Natural History Museum, London, <http://www.nhm.ac.uk/our-science/data/chalcidoids/database/detail>. (Last update, 17.03.2019)
- Ben-Dov Y., 1993. A systematic catalogue of the soft scale insects of the world (Homoptera: Coccoidea: Coccidae). Sandhill crane press, INC, Gainesville, Florida, Leiden, The Netherland, Flora & Fauna Handbook, 9. 536 pp.
- Ben-Dov Y., D.R. Miller & G.A.P. Gibson, 2009. ScaleNet: <http://www.sel.barc.usda.gov>.
- Blahutiak A., 1984. To the question of mass occurrence and efficiency of *Blastothrix confusa*, the parasite of *Parthenolecanium corni*. International Congress of Entomology, 17: 327.
- Bolu H., 2002. Güneydoğu Anadolu Bölgesi Antepfıstığı Alanlarındaki Böcek ve Akar Faunasının Saptanması. *Türkiye Entomoloji Dergisi*, 26 (3): 197-208. (In Turkish)

- Türk. Biyo. Mücadele Derg. Bolu, 2019, 10 (2):133-141
- Bolu H. & N. Uygun, 2003. Güneydoğu Anadolu Bölgesi antepfıstıklarında Coccoidea türleri, yayılış alanları, bulaşma oranları ve doğal düşmanlarının belirlenmesi. *Bitki Koruma Bülteni*, 43 (1-4): 111-123. (In Turkish)
- Botoc M., 1972. Encyrtidae (Hymenoptera, Chalcidoidea) noi pentru fauna R.S. Romania. *Studia Universitatis Babes-Bolyai. Cluj (Seria Biologie)*, 17(2): 87-90
- Boucek Z., 1961. Notes on the chalcid fauna (Chalcidoidea) of Moldavian SSR. Trudy Moldavskogo Nauchno-Issledovatel'skogo Instituta Sadovodstva, Vinogradarstva i Vinodeliya. Kishinev. 7: 15.
- Boucek Z., 1977. A faunistic review of the Yugoslavian Chalcidoidea (Parasitic Hymenoptera). *Acta Entomologica Jugoslavica*, 13(Supplement): 69 pp.
- Boucek Z. & M.W.R. de V. Graham, 1978. Chalcidoidea. (In: Fitton, M.G.; Graham, M.W.R. de V.; Boucek, Z.R.J.; Fergusson, N.D.M.; Huddleston, T.; Quinlan, J.; Richards, O.W. A check list of British Insects, Second Edition.) Handbooks for the Identification of British Insects. XI (4): 91 pp.
- Canard M., 1980 Occurrence in Greece of *Eulecanium tiliae* (Homoptera, Coccidae) on fig *Ficus carica* and its parasite *Blastothrix sericea*, new record (Hymenoptera, Encyrtidae). *Biologia Gallo-Hellenica*, 9:157-162.
- Çelik M.Y., 1983. Gaziantep ili Antepfıstıklarında Yaygın Olan Kabuklu Bit ve Koşnil Türlerinin Biyolojileri, Doğal Düşmanları ve Kış İlaçlamalarının Bazı Önemli Zararlılara Olan Etkileri Üzerinde Araştırmalar. Adana, Zirai Mücadele Araştırma Enstitüsü, Proje Nihai Raporu, 34 s. (In Turkish).
- Fallahzadeh M. & G. Japoshvili, 2010. Checklist of Iranian encyrtids (Hymenoptera: Chalcidoidea) with descriptions of new species. *Journal of Insect Science*, Tucson, 10 (68): 4.
- FAO, 2016. The Food and Agriculture Organization (FAO) of the United Nations. <http://faostat.fao.org/site> (Last update, 24.06.2019).
- Fusu L., 2001. Faunistic contributions to the knowledge of encyrtids (Hymenoptera, Chalcidoidea, Encyrtidae) of Romania. *Analele Stiintifice ale Universitatii "Al. I. Cuza" din Iasi. (Serie Noua) (Biologie Animala)* 47:31 view Fusu, L. (2001) in PDF format.
- Gijswijt M.J., 2003. Naamlijst van de Nederlandse bronswespen (Hymenoptera: Chalcidoidea). *Nederlandse Faunistische Mededelingen*. 18: 17-79.
- Girault A.A., 1917. Descriptions hymenopterorum chalcidoidicarum variorum cum observationibus. Page: 8.
- Girault A.A., 1920. New syrphidoid, cynipoid, and chalcidoid Hymenoptera. *Proceedings of the United States National Museum*, 58: 191.
- Gordh G., 1979. Family Encyrtidae. *Catalog of Hymenoptera in America North of Mexico 1:923* (Eds: Krombein, K.V.; Hurd, P.D. jr; Smith D.R.; Burks, B.D.) Washington, D.C.
- Hayat M., 1986. Family Encyrtidae. (In: Subba Rao, B.R.; Hayat, M. (Eds) - *The Chalcidoidea (Insecta: Hymenoptera) of India and the adjacent countries. Part II. Oriental Insects*, 20: 81.
- Herting B., 1972. Homoptera. A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy. 2:145-147,152 Commonwealth Agricultural Bureaux, Slough, England.
- Higashiura Y. & O. Tadauchi, 1995. A new record of *Blastothrix longipennis* (Hymenoptera, Encyrtidae) from Japan with a new host record. *Japanese Journal of Entomology*, 63(3): 522.
- Hodgson D. J., 1994. *The Scale Insect Family Coccidae and Identification Manual to Genera*. CAB International London, 639 pp.

New Parasitoids Records of *Eulecanium rugulosum* for Diyarbakır

- Hoffmann C. & H. Schmutterer, 2003. Contribution to the fauna of south-German scale insect antagonists (Coccina). *Entomologische Nachrichten und Berichte*, 47(3/4): 158.
- Japoshvili G.O., 2000. Checklist of encyrtids (Hymenoptera: Chalcidoide: Encyrtidae) in Georgia. Proceedings of the Institute of Zoology, Academy of Sciences of Georgia, 20:163.
- Japoshvili G.O. & I. Karaca, 2002. Coccid (Homoptera: Coccoidea) species of Isparta Province, and their parasitoids from Turkey and Georgia. *Turkish Journal of Zoology*, 26 (4): 371-376.
- Japoshvili G. & I. Karaca, 2003. New records of Encyrtid parasitoids of *Kermes palestinensis* Balachowsky (Homoptera: Kermesidae), with the description of a new species of *Blastothrix* Mayr (Hymenoptera: Encyrtidae) from Turkey. *Entomological News*, 114: 187-191.
- Japoshvili G. & J.S. Noyes, 2005. New data on Encyrtidae (Hymenoptera: Chalcidoidea) of the Transcaucasus and Turkey. *Zoosystematica Rossica*, 14 (1):135-145.
- Japoshvili G., 2007. New records of Encyrtidae (Hymenoptera, Chalcidoidea) with the description of three new species from Georgia. *Caucasian Entomological Bulletin*, 3(1): 81-84.
- Kaydan M.B., Ülgentürk S. & L. Erkiş 2007. Türkiye'nin Gözden Geçirilmiş Coccoidea (Hemiptera) Türleri Listesi. Yüzüncü Yıl Üniversitesi, Ziraat Fakültesi, *Tarım Bilimleri Dergisi*, 17(2): 89-106.
- Konov Y., 1965. A contribution to the parasitic insect fauna of Bulgaria. *Rasitelna Zashchita*, 13(7):9-11.
- Lagowska B., 1994. Notes on the life history of *Eulecanium douglasi* (Sulc) (Homoptera, Coccidae) and its parasites. *Annales Universitatis Mariae Curie-Sklodowska Lublin-Polonia* (C), 49: 191-194.
- Lotfalizadeh H., 2010. Some new data and corrections on Iranian encyrtid wasps (Hymenoptera: Chalcidoidea, Encyrtidae) fauna. *Biharean Biologist*, 4(2): 173.
- Moglan I., 2000. The parasite complex of *Parthenolecanium corni* Bouché (Coccidae, Homoptera) in Romania. *Mitteilungen der Deutschen Gesellschaft für Allgemeine und Angewandte Entomologie*, 12(1-6):133-139.
- Noyes J.S. & M. Hayat, 1994. Oriental mealybug parasitoids of the *Anagyrini* (Hymenoptera: Encyrtidae), 399 pp.
- Noyes J.S., 2004. Encyrtidae of Costa Rica (Hymenoptera: Chalcidoidea), 2. *Metaphycus* and related genera, parasitoids of scale insects (Coccoidea) and whiteflies (Aleyrodidae). *Memoirs of the American Entomological Institute*, 73: 1-459.
- O'Connor J.P., R. Nash & Z. Boucek, 2000. A catalogue of the Irish Chalcidoidea (Hymenoptera). *Occasional Publication of the Irish Biogeographical Society*, Number 6: 22pp.
- Öncüer C., 1991. A catalogue of the parasites and predators of insect pests of Turkey, 203 pp.
- Peck O., 1963. A catalogue of the Nearctic Chalcidoidea (Insecta; Hymenoptera). *Canadian Entomologist* (Supplement), 30: 424-425.
- Shi Z.Y., 1990. A new species and a record of the genus *Blastothrix* from China (Hymenoptera, Encyrtidae). *Acta Entomologica Sinica*, 33:462-465.
- Shi Z.Y., SG. Si & HZ. Wang 1995. Two new species of the genus *Blastothrix* Mayr from China (Hymenoptera: Encyrtidae). *Acta Entomologica Sinica*, 38(3): 363p.
- Shrestha A.B., 1995. Pistachio nut. In: Smartt J, Simmonds NW, editors. *Evolution of Crop Plants*, 2nd ed. Essex: Longman Scientific and Technical; 11-16 pp.

- Türk. Biyo. Mücadele Derg. Bolu, 2019, 10 (2):133-141
- Sugonjaev E.S., 1960. On the species of the genera allied to *Aphycus* Mayr (Hymenoptera, Chalcidoidea) from the european part of the USSR. *Entomologicheskoe Obozrenie*, 39(2):378p.
- Sugonjaev, E.S., 1963. A parasite of *Eulecanium corni*. *Zashchita Rasteniy, Moskva*, 1963, (3): 22-24.
- Şimşek A. & H. Bolu, 2017. Diyarbakır İli antepfıstığı (*Pistacia vera* L.) bahçelerindeki zararlı böcek faunasının belirlenmesi. *Dicle Üniversitesi, Fen Bilimleri Enstitüsü Dergisi*, 6 (2): 43-58.
- Thompson W.R., 1955. A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue, Part 3. Hosts of the Hymenoptera (Calliceratid to Evaniid). 240 pp., Commonwealth Agricultural Bureaux, The Commonwealth Institute of Biological Control, Ottawa, Ontario, Canada.
- Trjapitzin V.A., 1978. Hymenoptera II. Chalcidoidea 7. Encyrtidae. *Opredeliteli Nasekomykh Evropeyskoy Chasti, SSSR* 3: 294.
- Trjapitzin V.A., 1989. Parasitic Hymenoptera of the Fam. Encyrtidae of Palaearctics. *Opredeliteli po Faune, SSSR*, 158: 229.
- Tsalev M., 1965. The parasites of scales of the genus *Parthenolecanium* Sulc. in Bulgaria. *Rastitelna Zashchita*, 13(5): 25p.
- Tous J. & L. Ferguson, 1996. Mediterranean fruits. In: Janick J, editor. *Progress in new crops*. Arlington, VA: ASHS Press; 416-430 pp.
- Tudor C., 1982. Species of chalcidoid parasites of some injurious coccids. *Studii si Cercetari de Biologie (Seria Biologie Animala)*, 34(2):88.
- TÜİK, 2019. Tarım İstatistikleri Özeti, Yayın No:3640, 92 s., Ankara.
- Ülgentürk S., 2001. Parasitoids and predators of Coccidae (Homoptera: Coccoidea) species on ornamental plants in Ankara, Turkey. *Acta Phytopathologica et Entomologica Hungarica*, 36(3/4): 369-375.
- Ulrich W., 1999. Phenology, stratification and life cycles of the parasitic Hymenoptera in a beech forest on limestone. *Polskie Pismo Entomologiczne*, 68(3): 239.
- Xu G. & Z.Y. Shi, 1996. Three new records of the Encyrtidae family from China (Hymenoptera: Encyrtidae). *Acta Agriculturae Universitatis Henanensis*, 30(2): 120-122.
- Xu Z.H. & J. Huang, 2004. Chinese fauna of parasitic wasps on scale insects pp.106, National Natural Science Foundation of China (ISBN 7-5323-7377-0).
- Yanık E. & A. Yücel, 2001. The Pistachio (*P. vera* L.) Pests, Their Population Development and Damage State in Sanliurfa Province. XI GREMPA Seminar on Pistachios and Almonds, 1-4 September 1999, Sanliurfa (Turkey), 301-309.
- Yasnosh V.A. & G.O. Japoshvili, 1999. Parasitoids of the genus *Psyllaephagus* Ashmead (Hymenoptera: Chalcidoidea: Encyrtidae) in Georgia with the description of *P. Georgicus* sp. nov. *Bulletin of the Georgian Academy of Sciences*, 159 (3): 516-519.
- Zhang Y. & D. Huang, 2004. A review and an illustrated key to genera of Encyrtidae (Hymenoptera: Chalcidoidea) from China, pp.35, Science Press, Beijing, China (ISBN 7-03-012587-8; ISBN 1-880132-96-69).
- Zohary D., 1995. The genus *Pistacia* L. In: Padulosi S, Caruso T, Barone E, editors. *Taxonomy, distribution, conservation and uses of Pistacia genetic resources*. Rome, Italy: International Plant Genetic Resources Institute (IPGRI); 1-11.