

## NEW RECORDS OF THE GRAPE BERRY MOTH HYMENOPTEROUS PARASITOIDS IN IRAN

**Hosseinali Lotfalizadeh\***, **Ashkan Masnadi-Yazdinejad\*\***  
**and Moosa Saber\*\*\***

\* Department of Plant Protection, East-Azərbayjan Research Center for Agriculture & Natural Resources, Tabriz, IRAN. E-mail: lotfalizadeh2001@yahoo.com

\*\* Department of Insect Taxonomy, Iranian Research Institute of Plant Protection, Tehran, P. O. B. 19395-1454, IRAN.

\*\*\* Department of Plant Protection, Faculty of Agriculture, University of Maragheh, IRAN.

**[Lotfalizadeh, H., Masnadi-Yazdinejad, A. & Saber, M. 2012. New records of the grape berry moth hymenopterous parasitoids in Iran. Munis Entomology & Zoology, 7 (1): 284-291]**

**ABSTRACT:** The hymenopterous parasitoids of grape berry moth *Lobesia botrana* (Denis & Schiffermüller) (Lepidoptera: Tortricidae) in Iran were studied sparsely. This aggregation includes to twelve species belong to five families Bethyilidae, Braconidae, Ichneumonidae, Pteromalidae and Trichogrammatidae are listed as egg (two species), larva (nine species) and pupa (four species). During this study, two species *Dibrachys affinis* Masi (Hym.: Pteromalidae, Pteromainae) and *Itoplectis alternans* (Gravenhorst) (Hym.: Ichneumonidae, Pimplinae) are newly records for Iranian insect fauna and larval parasitoid of *L. botrana*. Finally all of the hymenopterous parasitoids of grape berry moth in Iran were reviewed.

**KEY WORDS:** Biological control, *Lobesia botrana*, parasitoid, Tortricidae, vineyard, new record, Iran.

The grape berry moth, *Lobesia botrana* (Denis & Schiffermüller) (Lepidoptera: Tortricidae), is a polyphagous insect that develops on various families plants and is a key pest of grapevine in vineyards worldwide. *Lobesia botrana* is known by different common names such as European vine moth, Grape moth, Grapevine moth, Mediterranean vine moth and Vine moth. Its ability to produce several generations annually, developing on the grapes and wild plants and its indirect damage by favoring the installation of rot fungi like *Aspergillus*, *Alternaria*, *Rhizopus*, *Cladosporium*, *Penicillium* and especially the grey rot caused by *Botrytis cinerea* (Fermaud, 1990; Ben Mosbah, 2005), make grape berry moth as an economically important pest in the wine growing areas around the world. In the most wine growing areas chemical treatment is the main control measure against this pest. Adults emerge in early spring from diapausing pupae, and females from the three or more successive generations which cause a direct damage to grapes by perforating berries and an indirect damage oviposit on flower buds, green berries, and mature grapevine berries, respectively (Saber et al., 1998; Jalil-Navaz, 1998; Saeedi, 2000). Crop losses from the pest can be substantial in some years and may be reach over 90% (Mashhadi-Jafarloo et al., 2004) or 95% of products (Jalil-Navaz, 1998) in some part of Iran. In the adjacent countries such as Uzbekistan, Azerbaijan, its damage can be 30-70% and may reach up to 80%.

This pest is widely distributed in the North Africa, Europe, Caucasus, Middle Asia, Middle East and some African countries (CAB International, 2002).

It mainly controls by chemical method using broad-spectrum insecticides. But considerable efforts have taken to explore and exploit to use natural enemies of grape berry moth. Seven parasitoid species: *Ascogaster quadridentata*, *Campoplex difformis*, *Dibrachys affinis*, *Dibrachys cavus*, *Hemiteles aerator*,

*Pimpla turionellae* and *Trichogramma evanescens* have been recorded on *L. botrana* (CAB International, 2002). While, Noyes (2010) listed 28 chalcidoid species as reported parasitoids of grape berry moth worldwide. They belong to Chalcididae (one species), Eulophidae (eight species), Eupelmidae (one species), Perilampidae (one species), Pteromalidae (five species) and Trichogrammatidae (twelve species). Ben Mosbah (2005) reported presence of predators that belong to the Arachnida and some insect orders (Neuroptera, Dermeptera, Orthoptera) and the parasitoids belong to the family of Tachinidae (Diptera) and the family of Braconidae (Hymenoptera), subfamily of Aghatidinae in Tunisia. The overall larval parasitism rate found on the experimental vineyard of France varied from 23% in 2000 to 53% in 2001 (Xuereb & Thiery, 2006). Eight hymenopterous species have been recorded as parasitic on the grape berry moth from southern Romania (Bărbuceanu & Jenser, 2009). Akbarzadeh-Shoukat et al. (2008a) reported six parasitoid species (five Hymenopterans and one Dipterans species) on grape berry moth larvae from north-west of Iran.

This pest is attacked by some predacious and parasitic insects. This review aimed to present an analytical presentation of all of known hymenopterous parasitoids of *L. botrana* in Iran and reporting new records.

### MATERIALS AND METHODS

Grapevine plant material and larvae of *L. botrana* originated from a vineyard located within East-Azarbayjan province (Azarshahr) and Fars provinces (Ghasr-e dasht). Insects were reared under Laboratory conditions.

Identifications of reared parasitoids were made using Doğanlar (1987) and Kolarov (2000). All of the families and species of reported parasitoids on grape berry moth from different areas of Iran were reviewed. List of occurred species is presented. Each family was discussed separately. Composition of each life stage parasitoids of *L. botrana* was compared.

### RESULTS AND DISCUSSION

This study shows that parasitoids of grape berry moth in Iran distributed in five families of Hymenoptera include in three super-families Chrysidoidea (Bethyloidea), Chalcidoidea (Pteromalidae and Trichogrammatidae) and Ichneumonoidea (Braconidae and Ichneumonidae). In this research two species of the families Ichneumonidae and Pteromalidae were identified that are new record for Iranian fauna.

#### ***Itoplectis alternans* (Gravenhorst) (Hym.: Ichneumonoidea, Ichneumonidae)**

The family Ichneumonidae is one of the most species-rich families of all organisms with an estimated 60,000 species in the world (Townes, 1969). This family is currently split into 39 subfamilies (Yu et al., 2005). Two ichneuomonid species were reared on *L. botrana* collected from south and northeast of Iran. *Enytus apostata* was reared only in the first generation of grape berry moth's larvae but Akbarzadeh-Shoukat et al. (2008b) reported this species on pupal stage of pest. The second species was identified as *Itoplectis alternans* (Gravenhorst) from subfamily Pimplinae that is new presented as larval parasitoid of *L. botrana*. This species wasp is emerged from larval stage of grape berry moth which was collected in the grape garden in Ghasr-e Dasht area of Shiraz city (Fars Province).

Eight ichneumonid species (50% of total parasitoids of *L. botrana*) have been reared on larvae and pupa of *L. botrana* in Iran (Akbarzadeh-Shoukat et al., 2008a, b) (see Table 1). Three ichneumonid species *Campoplex difformis*, *Hemiteles aerator* and *Pimpla turionellae* attack in Europe and North Africa larvae and pupae of grape berry moth (CAB International, 2002).

### ***Dibrachys affinis* Masi (Hym.: Chalcidoidea, Pteromalidae)**

Within the collected materials from East-Azarbayjan province, Azarshahr, we found *Dibrachys affinis* Masi, 1907. *D. affinis* is widely distributed in Europe and has been recorded from North Africa and Turkey in the Middle East (Noyes, 2010) but has not yet been reported from Iran. This species is parasitoid of different orders Diptera (Calliphoridae), Lepidoptera (such as Gelechiidae, Lymantriidae, Sesiidae, Tortricidae, Yponomeutidae). Its association with grape berry moth has been reported in France by Babi et al. (1992). They studied mass release of *D. affinis* against *L. botrana* in Alsace. Its parasitism rate was varied from 18% to 41.4% in overwintering generation and 9 to 12 wasps were emerged from each grape berry moth's pupae.

Coscolla Ramon (1981) reports this species as a pupae parasitoid of grape berry moth in Valencia, Spain with 34.8-61% parasitism rate. While, this species known a larval and pupal parasitoid in Algeria, Austria, France, Italy, Spain and Switzerland (CAB International, 2002).

Five pteromalid species have been listed world wide as parasitoids of grape berry moth *Ascogaster quadridentata* (CAB International, 2002), *Mesopolobus mediterraneus* (Perez Moreno et al., 2000), *Dibrachys affinis* (Babi et al., 1992), *Dibrachys boarmiae* (Vidal, 1997) and *Dibrachys cavus* (Haeselbarth, 1985, 1989; Perez Moreno et al., 2000). *Dibrachys affinis* and *D. cavus* attack larvae and pupae in Algeria, and some European countries (CAB International, 2002). Two pteromalids have been reared on grape berry moth in the northwest of Iran (Akbarzadeh-Shoukat et al., 2008b) (see Table 1).

## **DISCUSSION**

List of the parasitoid families and their species on the grape berry moth in Iran was presented in the Table 1. Considering this wide range of native hymenopterous parasitoids that control *L. botrana* can be used in the biological control program against this important pest. Be advised please that the potential possibilities of the practical utilization of these parasitoids remain unrealized because their biology and their role in nature have not been sufficiently investigated.

These parasitoids attack to different life stages of *L. botrana*. Most of the known parasitoids (%50) are larval parasitoid (Fig. 1). Based on Akbarzadeh-Shoukat et al. (2008a), rate of larval parasitism of *L. botrana* varied 1% to 16.8% (average 6.33%). This parasitism was significantly different in other localities and the rest generations, but the maximum rate of parasitism was in the first generation of the pest.

### **1. Family Bethyliidae (Hym.: Chrysidoidea)**

The world fauna of Bethyliidae (Hymenoptera, Chrysidoidea) is represented by 2,216 species distributed in 97 genera of seven subfamilies. This family is poorly known in Iran. In this family *Goniozus* Förster includes to Bethylinae and has 160 species worldwide. Two species of this genus have reared on larvae of *L. botrana* in the northeast of Iran (Alavi & Gholizadeh, 2008). Alavi & Gholizadeh (2008)

reported *Goniozus audouinii* Westwood that is junior synonymy of *Goniozus claripennis* Förster.

Terayama (2003) presented following characters for distinguishing this genus: antenna with 13 segments; always fully winged, basal vein oblique, only slightly angled, leaving median vein at about the same point as the transverse median vein; transverse median vein near based of the apparent basal vein, prostigma large, forming a subtriangle,  $Rs + m$  vein shorter than  $rs$  vein; median carina of clypeus short, extending up to the frons at most for short distance.

## 2-Family Braconidae (Hym.: Ichneumonoidea)

The family Braconidae is one of the largest families in the Hymenoptera containing more than 15,000 valid species (Wharton, 1993). This family is among the foremost of these beneficial insects. *Habrobracon* is a specious genus of the family with wide range of the host but *H. hebetor* is a common parasitoid of moths (Lepidoptera). Two braconid species have been reared on pupal stage of *L. botrana* in the northwest of Iran (Akbarzadeh-Shoukat et al., 2008a).

## 3-Family Trichogrammatidae (Hym.: Chalcidoidea)

Trichogrammatidae represent minute size wasps that act as egg parasitoids of insects. Twelve trichogrammatids has been recorded on *L. botrana*: *Trichogramma agrotidis* (Fry, 1989), *Trichogramma brassicae* (Fry, 1989; Lozzia & Rigamonti, 1991; Ebrahimi et al., 1998) *Trichogramma cacaeciae* (Barnay et al., 1999; Castaneda Samayoa et al., 1993; Tavares et al., 1988; Zimmerman et al., 1997), *Trichogramma daumalae* (Dugast & Voegelé, 1984; Fry, 1989), *Trichogramma dendrolimi* (Castaneda Samayoa et al., 1993), *Trichogramma embryophagum* (Castaneda Samayoa et al., 1993; Fry, 1989), *Trichogramma euproctidis* (Sugonjaev & Sorokina, 1978), *Trichogramma evanescens* (Castaneda Samayoa et al., 1993; Fry, 1989; Hommay et al., 2002; Nasr et al., 1995), *Trichogramma principium* (Fry, 1989), *Trichogramma semblidis* (Sengonca et al., 1990; Sengonca et al., 1987), an unidentified *Trichogramma* and *Trichogrammatoidea brasiliensis* (Noyes, 2010). The latter is a species that distributed in Afrotropical, Neotropical and Oriental regions (Voegelé et al., 1974).

Within this list, *T. ingricum* has not been reported as parasitoid of *L. botrana*. It is widely distributed in the north and northwest of Iran as parasitoid of *L. botrana*, *Cydia pomonella* (L.) and *Chilo supressalis* Walker (Ebrahimi & Akbarzadeh-Shoukat, 2008). Biocontrol effect of *T. ingricum* on *L. botrana* was assessed about 60% in Urmia vineyards (Ebrahimi & Akbarzadeh-Shoukat, 2008). They reported its widely distribution in this region with the 40-50% parasitism in the first generation of *L. botrana*.

Regarding to the importance of grape berry moth as a key pest, it would be essential to control pest before entering in the host fruit. Therefore its egg parasitoids have most inhibitor role in decrease of damage. In Iran only two species (11%) have known as egg parasitoid. Akbarzadeh-Shoukat & Ebrahimi (2008) reported 6% to 42% egg parasitism of first generation in different localities of West-Azarbayjan province (Northwest of Iran). They mentioned presence of this parasitoid in most of vineyards (about 90%) of this area.

Recently seven parasitoid species have been reported on pupal stage of *L. botrana* (Akbarzadeh-Shoukat et al., 2008b). Mean of pupal parasitism was estimated 21% and it was ranged 12-42% in this study.

## LITERATURE CITED

- Akbarzadeh-Shoukat, G. & Ebrahimi, E.** 2008. Egg parasitoids and their role in biological control of grape berry moth *Lobesia botrana* (Denis & Schiff.) (Lep.: Tortricidae) in Orumieh vineyards. Proceeding of 18<sup>th</sup> Iranian Plant Protection Congress, 24-27 Aug., Hamedan, Iran, p: 19.
- Akbarzadeh-Shoukat, G., Ebrahimi, E. & Masnadi-Yazdinejad, A.** 2008a. Larval parasitoids of *Lobesia botrana* (Denis & Schiff.) (Lep.: Tortricidae) on grape in Orumieh, Iran. Proceeding of 18<sup>th</sup> Iranian Plant Protection Congress, 24-27 Aug., Hamedan, Iran, p: 20.
- Akbarzadeh-Shoukat, G., Horstmann, K. & Ebrahimi, E.** 2008b. Study on the pupal parasitoids of grape berry moth *Lobesia botrana* (Denis & Schiff.) (Lep.: Tortricidae) and their role in an IPM program in vineyard. Proceeding of 18<sup>th</sup> Iranian Plant Protection Congress, 24-27 Aug., Hamedan, Iran, p: 21.
- Alavi, J. & Gholizadeh, M.** 2008. Report of two parasitoids bethylid wasps on larva of grape berry moth *Lobesia botrana* (Denis & Schiff.) (Lepidoptera: Tortricidae) from Khorasan-e-Shomali province. Proceeding of 18<sup>th</sup> Iranian Plant Protection Congress, 24-27 Aug., Hamedan, Iran, p: 74.
- Babi, A., Marro, J.-P. & Schubert, G.** 1992. Premieres experimentations de lachers inondatifs de *Dibrachys affinis* Masi (Hym. Pteromalidae) contre l'eudemis de la vigne *Lobesia botrana* Denis & Shiffermuller [sic] (Lep. Tortricidae) en Alsace. Bulletin de la Société Entomologique de Mulhouse, 29-32.
- Bărbuceanu, D. & Jenser, G.** 2009. The parasitoid complex of *Lobesia botrana* (Denis et Schiffermüller) (Lep.: Tortricidae) in some vineyards of southern Romania. Acta Phytopathologica et Entomologica Hungarica, 44 (1): 177-184.
- Barnay, O., Pizzol, J., Gertz, C., Kienlen, J.C., Hommay, G. & Lapchin, L.** 1999. Host density-dependence of discovery and exploitation rates of egg patches of *Lobesia botrana* (Lepidoptera: Tortricidae) and *Ephestia kuehniella* (Lepidoptera: Pyralidae) by the parasitoid *Trichogramma cacoeciae* (Hymenoptera: Trichogrammatidae). Journal of Economic Entomology, 92 (6): 1311-1320.
- Ben Mosbah, A.** 2005. Presence of predators and parasitoids of *Lobesia botrana* Den. & Schiff. (Lepidoptera : Tortricidae) in the Mediterranean vineyard. MSc Thesis, IAMB Mediterranean Agronomic Institute of Bari, Organic Farming.
- CAB International.** 2002. *Crop Protection Compendium, 2002 Edition*. CAB International, Wallingford, UK.
- Castaneda Samayoa, O., Holst, H. & Ohnesorge, B.** 1993. Evaluation of some *Trichogramma* species with respect to biological control of *Eupoecilia ambiguella* Hb. and *Lobesia botrana* Schiff. (Lep., Tortricidae). Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz, 100 (6): 599-610.
- Coscolla Ramon, R.** 1981. Some observations about the pteromalid *Dibrachys affinis* Masi., parasite of *Lobesia botrana* Den. and Schiff. (grapevine raceme moth). Boletín - Servicio de Defensa contra Plagas e Inspeccion Fitopatologica, 7 (1-2): 57-63.
- Doğanlar, M.** 1987. Hypopygia of most Nearctic and Palaearctic species of *Dibrachys* Foerster, key to most species of the genus and descriptions of three new species (Hymenoptera, Pteromalidae). Spixiana, München, 10: 191-206.
- Dugast, J. F. & Voegelé, J.** 1984. The trichogrammatid parasites of vine moths; discovery of a new species: *Trichogramma daumalae* (Hym. Trichogrammatidae). Actes de l'Institut Agronomique et Vétérinaire Hassan II, Morocco (Nr Sp. Zool.), 4 (1): 14.
- Ebrahimi, E. & Akbarzadeh-Shoukat, G.** 2008. Report of *Trichogramma ingricum* (Hym.: Trichogrammatidae) from Iran. Journal of Entomological Society of Iran, 27 (2): 43-45.
- Ebrahimi, E., Pintureau, B. & Shojai, M.** 1998. Morphological and enzymatic study of the genus *Trichogramma* in Iran (Hym.: Trichogrammatidae). Applied Entomology and Phytopathology, 66 (1/2): 39-42.
- Fermaud, M.** 1990. Incidence des attaques larvaires d'Eudémis *Lobesia botrana* sur le développement de la Pourriture Grise Botrytis cinerea chez la vigne: rôle des facteurs du milieu et mécanismes mis en jeu. Paris, France: Thèse Doctoral de l'INA PG, INRA.

- Fry, J. M.** 1989. Natural enemy databank, 1987. A catalogue of natural enemies of arthropods derived from records in the CIBC Natural Enemy Databank. pp. 129 CAB International, Wallingford, Oxford, UK.
- Haeselbarth, E.** 1985. Determination list of entomophagous insects 10. *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique*, 8 (4): 1-61.
- Haeselbarth, E.** 1989. Determination list of entomophagous insects. No. 11. *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique*, 12 (7): 1-62.
- Jali-Navaz, M. R.** 1998. Number of generations and the most appropriate time of chemical control of *Lobesia botrana* Den. & Schiff. (Lep.: Tortricidae) in Takestan. *Proceeding of 13<sup>th</sup> Iranian Plant Protection Congress, 23-27 Aug., p.: 122.*
- Kolarov, J.** 2000. Fauna and zoogeography of the Balkan peninsula Pimplini (Hymenoptera, Ichneumonidae). II. Genus *Itoplectis* Foerster, *Godishnik na Sofiiskiia Universitet "Sv. Kliment Okhridski" Biologicheski Fakultet Kniga. 1 Zoologiya*, 91: 25-37.
- Lozzia, G. C. & Rigamonti, I. E.** 1991. Observations on strategies of biological and integrated control of grape moths in northern Italy. *Vignevini*, 18 (11): 33-37.
- Mashahdi-Jafarloo, M., Kazemi, M. H., Golshan, F. & Irandust, M.** 2004. Evaluation of the population dynamics of grape berry moth, *Lobesia botrana* Den. & Schiff. (Lep.: Tortricidae) to determine the best application times of insecticides. *Proceeding of 16<sup>th</sup> Iranian Plant Protection Congress, 28 Aug.-1 Sept, p.: 328.*
- Nasr, F. N., Korashy, M. A. & Rashed, F. F. M.** 1995. *Trichogramma evanescens* West. (Hym., Trichogrammatidae) as an egg parasitoid of grape moth *Lobesia botrana* (Den. & Schiff.) (Lep., Tortricidae). *Anzeiger für Schädlingskunde, Pflanzen- und Umweltschutz*, 68 (2): 44-45.
- Noyes, J. S.** 2010. Universal Chalcidoidea Database. World Wide Web electronic publication. [www.nhm.ac.uk/entomology/chalcidoids/index.html](http://www.nhm.ac.uk/entomology/chalcidoids/index.html) (Accessed 30.2.2010).
- Perez Moreno, I., Saenz de Cabenzon, F. J. & Marco, V.** 2000. Evaluation of natural parasitism on hiberate pupae of the European grape moth (*Lobesia botrana* Den. & Schiff.) in vineyard of La Rioja. *Boletín de Sanidad Vegetal Plagas*, 26(4, supplement): 715-721.
- Saber, M., Maleki-Milani, H., Nazemieh, A. & Rezvani, A.** 1998. Study of the biology of grape berry moth, *Lobesia botrana* Den. & Schiff. in Azarshahr and Khalatpoushan regions, Tabriz. *Proceeding of 13<sup>th</sup> Iranian Plant Protection Congress, 23-27 Aug., p.: 137.*
- Saedi, K.** 2000. Biology of grape berry moth, *Lobesia botrana* Den. & Schiff. (Lep.: Tortricidae) in Boyer-Ahmad region. *Proceeding of 14<sup>th</sup> Iranian Plant Protection Congress, 5-8 Sept, p.: 110.*
- Sengonca, C., Klute, J. & Schade, M.** 1990. Finding suitable alternative hosts for the promotion of one of the grape vine moth parasitoid *Trichogramma semblidis* (Auriv.) (Hymenoptera: Trichogrammatidae) in the wine-growing of the Ahr valley. Part I: Parasitization of different hosts. *Mitteilungen der Deutschen Gesellschaft für Allgemeine und Angewandte Entomologie*, 7 (4-6): 563-569.
- Sengonca, C. & Leisse, N.** 1987. Occurrence and importance of *Trichogramma semblidis* Auriv. (Hymenoptera, Trichogrammatidae) an egg parasite of the grape vine moth in the Ahr Valley, West Germany. *Journal of Applied Entomology*, 103 (5): 527-531.
- Sooudi, M., Shjoai, M., Nasrollahi, A. A. & Assar, M.** 2006. Study of the seasonal fluctuation, damage percentage and determination of pupal parasitoid of *Lobesia botrana* (Lep., Tortricidae) in Sharriar region, Ghazvin province. *Proceeding of 17<sup>th</sup> Iranian Plant Protection Congress, 2-5 Sept, p.: 291.*
- Sugonjaev, E. S. & Sorokina, A. P.** 1978. Hymenoptera II. Chalcidoidea 16. Trichogrammatidae (*Trichogramma* Westw.). *Opred. Naske. Evrop. Chasti SSSR* pp. 507.
- Tavares, J., Oliveira, L., Teixeira, R., Anunciada, L., Moreira, I., Santos, F., Madeira, D., Henriques, L. & Matias, H.** 1988. Biological control of *Lobesia botrana* Den. & Schiff. (Lep.: Tortricidae) using *Trichogramma cacoeciae* Marchal (Hym.: Trichogrammatidae). *Boletim da Sociedade Portuguesa de Entomologia*, 4-1 (103): 1-11.

**Terayama, M.** 2003. Phylogenetic systematics of the family Bethyidae (Insecta: Hymenoptera). Part II. Keys to subfamilies, tribes and genera in the world. Academic Rep., Fac. Eng., Tokyo Polytechnic Univ., 26 (1): 16-29.

**Townes, H.** 1969. The genera of Ichneumonidae, Part 1. Memoirs of the American Entomological Institute, 11: 1-300.

**Xuereb, A. & Thiery, D.** 2006. Does natural larval parasitism of *Lobesia botrana* (Lepidoptera: Tortricidae) vary between years, generation, density of the host and vine cultivar? Bulletin of Entomological Research, 96 (2): 105-110.

**Vidal, S.** 1997. Determination list of entomophagous insects. Nr. 13. Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique, 20 (2) : 53 p.

**Voegelé, J., Brun, P. & Daumal, J.** 1974. Les trichogrammes: I. Modalités de la prise de possession et de l'élimination de l'hôte chez le parasite embryonnaire *Trichogramma brasiliensis* (Hym. Chalcidoidea). Annales de la Société Entomologique de France, 10 (3): 757-762.

**Wharton, R. A.** 1993. Bionomics of the Braconidae. Annu. Rev. Entomol., 38: 121-43.

**Yu, D. S., van Achterberg, K. & Horstmann, K.** 2005. World Ichneunoidea. Taxonomy, Biology, Morphology and Distribution. CD/DVD. Taxapad, Vancouver, Canada.

**Zimmerman, O., Holst, H. & Wuhrer, B.** 1997. Biological control of the grape berry moths *Eupoecilia ambiguella* Hb. and *Lobesia botrana* Schiff. with *Trichogramma cacoeciae* Marchal. Mitteilungen der Deutschen Gesellschaft für Allgemeine und Angewandte Entomologie, 11 (1-6): 363-366.

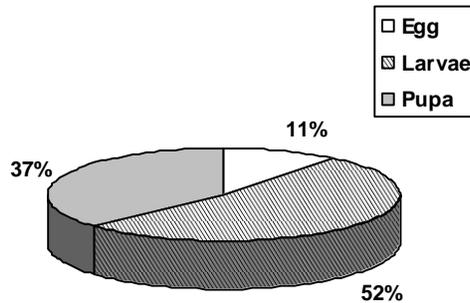


Figure 1. Percent of each life stage parasitoids of *Lobesia botrana* in Iran.

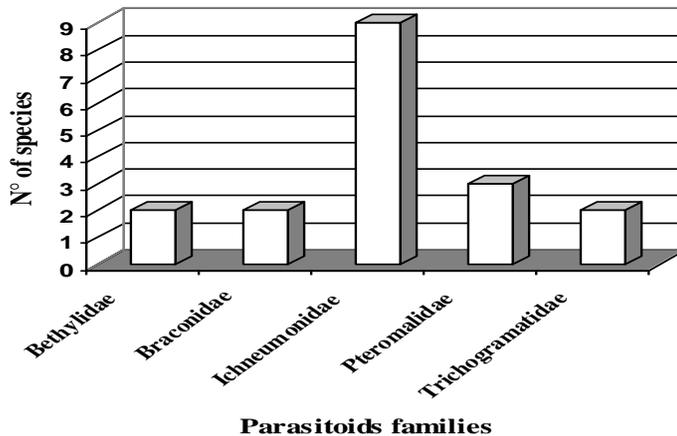


Figure 2. Quantitative distribution of Iranian hymenopterous parasitoid of *Lobesia botrana* in five families.

Table 1. Hymenopterous parasitoids of grape berry moth in Iran.

Parasitoids	Host stage	Distribution	References
<b>Braconidae</b>			
<i>Habrobracon hebetor</i> Say	pupae	<b>West-Azərbayjan,</b> Orumieh	AKBARZADEH-SHOUKAT et al. (2008b)
<i>Habrobracon</i> sp.	pupae	<b>West-Azərbayjan,</b> Orumieh	AKBARZADEH-SHOUKAT et al. (2008b)
<b>Ichneumonidae</b>			
<i>Enytus apostata</i> Gravenhorst	larvae, pupae	<b>West-Azərbayjan,</b> Orumieh <b>Ghazvin</b> <b>East-Azərbayjan,</b> Azarshahr	Akbarzadeh-Shoukat et al. (2008b); Sooudi et al. (2006) Present paper
<i>Pristomerus vulnerator</i> (Panzer)	pupae	<b>West-Azərbayjan,</b> Orumieh	Akbarzadeh-Shoukat et al. (2008b)
<i>Temelucha</i> sp.	pupae	<b>West-Azərbayjan,</b> Orumieh	Akbarzadeh-Shoukat et al. (2008b)
<i>Itopectis tunetana</i> (Schmiedeknecht)	larvae	<b>West-Azərbayjan,</b> Orumieh	Akbarzadeh-Shoukat et al. (2008a)
<i>Itopectis alternans</i> (Gravenhorst)	larvae	<b>Fars,</b> Shiraz, Ghasr-e Dasht	New record (Present paper)
<i>Pimpla confinis</i> Kasparyan	larvae	<b>West-Azərbayjan,</b> Orumieh	Akbarzadeh-Shoukat et al. (2008a)
<i>Dicaelotus inflexus</i> Thomson	larvae	<b>West-Azərbayjan,</b> Orumieh	Akbarzadeh-Shoukat et al. (2008a)
An unknown Labiinae	pupae	<b>West-Azərbayjan,</b> Orumieh	Akbarzadeh-Shoukat et al. (2008b)
<b>Bethylidae</b>			
<i>Goniozus claripennis</i> Förster	larvae	<b>North-Khorasan</b>	Alavi & Gholizadeh (2008)
<i>Goniozus gallicola</i> (Kiffer)	larvae	<b>North-Khorasan</b>	Alavi & Gholizadeh (2008)
<b>Pteromalidae</b>			
<i>Dibrachys affinis</i> Masi	pupae	<b>East-Azərbayjan,</b> Azarshahr	New record (Present paper)
<i>Pteromalus puparum</i> (L.)	larvae	<b>West-Azərbayjan,</b> Orumieh	Akbarzadeh-Shoukat et al. (2008b)
<i>Homoporus</i> sp.	larvae	<b>West-Azərbayjan,</b> Orumieh	Akbarzadeh-Shoukat et al. (2008b)
<b>Trichogrammatidae</b>			
<i>Trichogramma</i> <i>embryophagum</i> (Hartig)	egg	<b>West-Azərbayjan,</b> Orumieh	Akbarzadeh-Shoukat and Ebrahimi (2008)
<i>Trichogramma</i> <i>ingricum</i> Sorokin	egg	<b>West-Azərbayjan,</b> Orumieh	Akbarzadeh-Shoukat and Ebrahimi (2008), Ebrahimi & Akbarzadeh- Shoukat (2008)