

***Goniozus claripennis* (Förster 1851) (HYMENOPETRA: BETHYLIDAE)
AS PARASITOID OF GRAPE LEAF-ROLLER *Sparganothis pilleriana* (Den. et Schiff.)
(LEP: TORTRICIDAE) LARVAE IN SOUTHERN VINEYARDS OF ROMANIA**

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Abstract. Research conducted in two southern vineyards of Romania, Ștefănești (Argeș County) and Dăbuleni (Dolj County) highlighted the *Goniozus claripennis* species as primary, larval and gregarious ectoparasitoid of *Sparganothis pilleriana*. Parasitoid adults can be found in vineyards in late April, early May, depending on local and annual microclimate and parasitize host larvae of different ages. In this study, 11 individuals of *G. claripennis* on the host larva is a new record. The contribution of the parasitoid in parasitizing the grape leaf-roller larvae is 3.37%. Parasitoid activity manifests itself more strongly in the Dăbuleni vineyards (5.2%) where the pest population is larger in number. The host-parasitoid relationship is new to Romania.

Keywords: vineyards, host larvae, ectoparasitoid, percentage of parasitation.

Rezumat. *Goniozus claripennis* (Förster 1851) (Hym: Bethylidae), un parazitoid al larvelor de *Sparganothis pilleriana* (Den. et Schiff.) (Lepidoptera: Tortricidae) în viile din sudul României. Cercetări efectuate în două podgorii din sudul României, Ștefănești (Județul Argeș) și Dăbuleni (Județul Dolj) au evidențiat specia *Goniozus claripennis* ca ectoparazitoid primar, larvar și gregar al larvelor de *Sparganothis pilleriana*. Adulții parazitoidului se întâlnesc în vii la sfârșitul lunii aprilie, începutul lunii mai, în funcție de microclimatul local și anual și parazitează larve ale gazdei de vârste diferite. În acest studiu, prezența a 11 parazitoizi pe o larvă gazdă este un nou record. Contribuția parazitoidului în parazitarea larvelor moliei frunzelor viței de vie este de 3,37%. Activitatea parazitoidului se manifestă în procent mai mare în viile din Dăbuleni (5,2%), unde populația dăunătorului prezintă efective mai mari. Relația parazitoid-gazdă este nouă pentru România.

Cuvinte cheie: podgorie, larva gazdă, ectoparazitoid, procentaj de parazitare.

INTRODUCTION

Goniozus claripennis (Förster 1851) (= *Bethylus formicarius* Audouin; = *Goniozus audouini* Westwood) is a primary, larval and gregarious ectoparasitoid, known from hosts such as *Tortrix viridana* Linnaeus 1758, *Sparganothis pilleriana* (Denis & Schiffermüller 1775) and *Eupoecilia ambiguella* (Hübner 1796) (TRJAPIȚĂN, 1978). The first to report the species as a parasitoid of *S. pilleriana* larvae was AUDOUIN in 1842 (in VOUKASSOVICH, 1924), who observed and described its development. Subsequently, the species was also reported in other European regions, but it was only VOUKASSOVICH (1924) who devoted it a detailed study on the occasion of his research on the biology and parasitoids of microlepidoptera *S. pilleriana*. Observations on the biology of this species are also performed by ZEROVA et al. (1989).

In Romania, the species has been also obtained from two hosts: *Archips rosanus* Linnaeus 1758 and *Adoxophyes orana* (Fischer von Roslerstamm 1834) (DIACONU, 1999). Parasitization of larvae of different ages and gregarious behaviour turns this species into a particularly attractive one to the biological control programs.

In the present study, we observed aspects of biology and the importance in reducing of the host populations.

MATERIAL AND METHODS

The observations were carried out in two vineyards in southern Romania namely Ștefănești and Dăbuleni. The vineyards of Ștefănești located in the central southern region of the Wallachian hills, and characterized, over the period of the observations, by a rather wet and cool climate, present a small *S. pilleriana* population. This microlepidopteran was identified and observed in a vineyard of about 3 hectares in the plot growing the “Fetească regală” variety. In the vineyards of Dăbuleni, located in southern Oltenia near the Danube, with a climate characterized by Mediterranean influences, the *S. pilleriana* population is well developed. The observations were carried out, in a vineyard of about 2 hectares, on the variety called “Roșioară”. The larvae host was collected in May-July period, 2000-2003 in Ștefănești, and 2000-2002 in Dăbuleni. The caterpillars were reared isolatedly up to the apparition of tortricid or parasitoid adults, their food being the vine leaves. 87 individuals of *G. claripennis* were achieved under laboratory conditions.

RESULTS AND DISCUSSIONS

The data about the recorded parasitoids have been arranged in the following order: collecting date/stage of host/stage of collected parasitoid/individuals (♀ and ♂) obtained.

It was obtained as a larval, gregarious, primary endoparasitoid in:

Ștefănești: June 9, 2000/mature larva/larva/2♀♀; June 16, 2001/immature larva/larva/2♀♀; June 26, 2001/larva remains/cocoon/ 2♀♀,1♂; June 29, 2001/ mature larva/larva/3♀♀, 2♂♂; June 28, 2002/mature larva/larva/1♀,

1♂, 1 hyperparasitoid;

Dăbuleni: May 9, 2000/immature larva V2/larva/1♀, 1♂, 1 hyperparasitoid; May 26, 2000/immature larva V3/larva/2♀♀, 1♂; June 27, 2000/mature larva/cocoon/2♀♀; June 27, 2000/larva remains/cocoon/2♀♀; 1 hyperparasitoid; June 27, 2000/ larva remains/cocoon/1♀, 1♂; May 26, 2001/ immature larva V2/two eggs/2♀♀; May 26, 2001/immature larva V3/larva/2♀♀, 1♂; May 26, 2001 immature larva V3/larva/2♀♀; June 19, 2001/larva remains/cocoon/ 1♀, 1♂; June 19, 2001/ larva remains/cocoon/ 3♀♀, 1♂; June 19, 2001/ larva remains/cocoon/ 2♀♀; July 5, 2001/ larva remains/cocoon/ 5♀♀, 2♂♂; July 5, 2001/ larva remains/cocoon/6♀♀, 2♂♂; July 5, 2001/ mature larva/larva/ 7♀♀, 3♂♂, 1 hyperparasitoid; July 5, 2001/ immature larva V3/ larva/2♀♀, 1♂; July 5, 2001/ larva remains/cocoon/ 3♀♀; July 5, 2001/ larva remains/cocoon/ 2♀♀; July 5, 2001/ mature larva /larva/4♀♀, 1♂; May 27, 2002/immature larva V4/larva/1♀, 2 hyperparasitoids; June 17, 2002/larva remains/cocoon/3♀♀; June 17, 2002/ mature larva /larva/2♀♀, 1♂; June 17, 2002/larva remains/ cocoon/ 2♀♀.

Some aspects of the biology of *Goniozus claripennis*

Period of activity of the parasitoid

According to our observations, the period during which the *S. pilleriana* larvae can be parasitized is about a month and a half, parasitoid adults occurring in southern vineyards of Romania since late April, early May. Thus, in Dăbuleni, where the species was more frequent, in 2000, the first parasitized larvae were collected the earliest at the beginning of May, on the 9th of May, and the latest on the 27th June, and in 2001 (colder thermally), the first parasitized larvae were collected on the 26th May, while the last on of 5th July.

G. claripennis parasitized both young and fully developed caterpillars, larvae of the 2nd, 3rd, 4th and 5th ages, respectively.

The eggs are laid on the caterpillar body, dorsal, on the previous segments and rarely on the posterior. PETER & DAVID (1991) observed a closed species, *G. sensorius* Gordh 1988, and the maximum number of eggs are laid on the 6th and 7th segment, and none in the terminal segments. As for the collected specimens, the number of laid eggs varied between 2 and 11. After hatching, parasitized larvae remain attached to the body of the *S. pilleriana* larva, the most forward part narrowing into a sucking organ deeply stuck into the host larva body.

The mobility of parasitized caterpillars depends on the age, size and number of parasitic larvae. Thus, fully grown *Sparganothis pilleriana* caterpillars which had on them 2-3 *G. claripennis* larvae of about 1-1.5 mm in length were still active, while young caterpillars, parasitized by larvae of 1-1.5 mm, were lumbered

The number of parasitoid larvae growing on a host is in relation to its size. On the 5th of July, 2001, in Dăbuleni a fully grown *S. pilleriana* caterpillar was collected, which presented on its body 11 parasitoid larvae, of which only 10 have reached maturity, the eleventh being hyperparasitized. In his research, VOUKASSOVITCH (1924) mentions a maximum of eight *G. claripennis* larvae on the host caterpillar. In our study, young aged caterpillars were parasitized by 2-3 *G. claripennis* larvae.

Parasitic larvae, after having completed their development, leave the host larva of which only the tegument remains and spin a globulous cocoon of a lighter braid, where they turn into nymphs, as highlighted in the research undertaken. Thus, individuals which have turned into nymphs shortly after collection required under laboratory conditions 7-8 days to turn into adults. For example, on the 5th July 2001 in Dăbuleni, 7 yellowish fully grown larvae were collected, located next to the remnants of a *S. pilleriana* larva, on 7th July they wove the cocoons and on 15th July the *G. claripennis* adults hatched.

Sex-ratio

From the literature it can be gathered that the number of the females is much larger than that of the males. In full agreement with the above data, in the year 2001 in Dăbuleni, from 13 larvae of *S. pilleriana* parasitized, 53 individuals of *G. claripennis* developed, from which 41 females, and 12 males. Males had a percentage of 22.64%, while females covered 77.35% (Table 1).

Table 1. *Goniozus claripennis* individuals obtained in 2001.

Locality	Date of collecting	No. of larvae parasitized	♂♂, ♀♀
Dăbuleni	May 26	3	6♀♀, 1♂
	June 19	3	6♀♀, 2♂♂
	July 5	7	29♀♀, 9♂♂
Ștefănești	June 16	1	2♀♀
	June 26	1	3♀♀
	June 29	1	3♀♀, 2♂♂
Total		16	49♀♀, 14♂♂

In Dăbuleni, on the 5th of July 2001, out of 10 *G. claripennis* larvae which had parasitized a *S. pilleriana* caterpillar of last age collected, 7 ♀♀ and 3 ♂♂ were obtained.

During the research, the females are much more numerous than the males, 67 ♀♀ and 20 ♂♂, so the sex-ratio has a sub-unit value: 0.29.

The importance of the species *Goniozus claripennis* in the larval parasitism of the host

Due to gregarious behaviour and parasitation of larvae of different ages, this Hymenoptera, *G. claripennis* has great importance in controlling the populations of the species that it parasitizes. In this study, the parasitoid contributes with 3.37 % to reducing the grape leaf-roller larvae (Table 2). Thus, within the complex of larval parasitoids of *Sparganothis pilleriana*, *G. claripennis* species, it has a greater role as compared to another larval gregarious ectoparasitoid, *Colpoclypeus florus* (Walker 1839) (BĂRBUCEANU & ANDRIESCU, 2010).

Table 2. Importance of *Goniozus claripennis* in parasitizing *Sparganothis pilleriana* larvae.

Locality	Year	No. of larvae collected	No. of larvae parasitized	%	<i>Goniozus claripennis</i>	
					No. of larvae parasitized	%
Ștefănești (Ag)	2000	48	9	18.75	1	2.08
	2001	103	10	9.71	3	2.91
	2002	118	13	11.02	1	0.85
	2003	107	24	22.43	-	-
Subtotal		376	56	14.9	5	1.33
Dăbuleni (DJ)	2000	152	33	21.71	5	3.29
	2001	140	31	22.14	13	9.29
	2002	131	13	9.92	4	3.05
Subtotal		423	77	18.2	22	5.2
Total		799	133	16.65	27	3.37

Host parasitizing percentages have higher values in Dăbuleni vineyards than in those from Ștefănești (Fig.1), situation due to host development conditions in this vineyard. During the study period, parasitoid participation in parasitizing host larvae was 5.2% in Dăbuleni, while in Ștefănești, larva parasitization was only 1.33%.

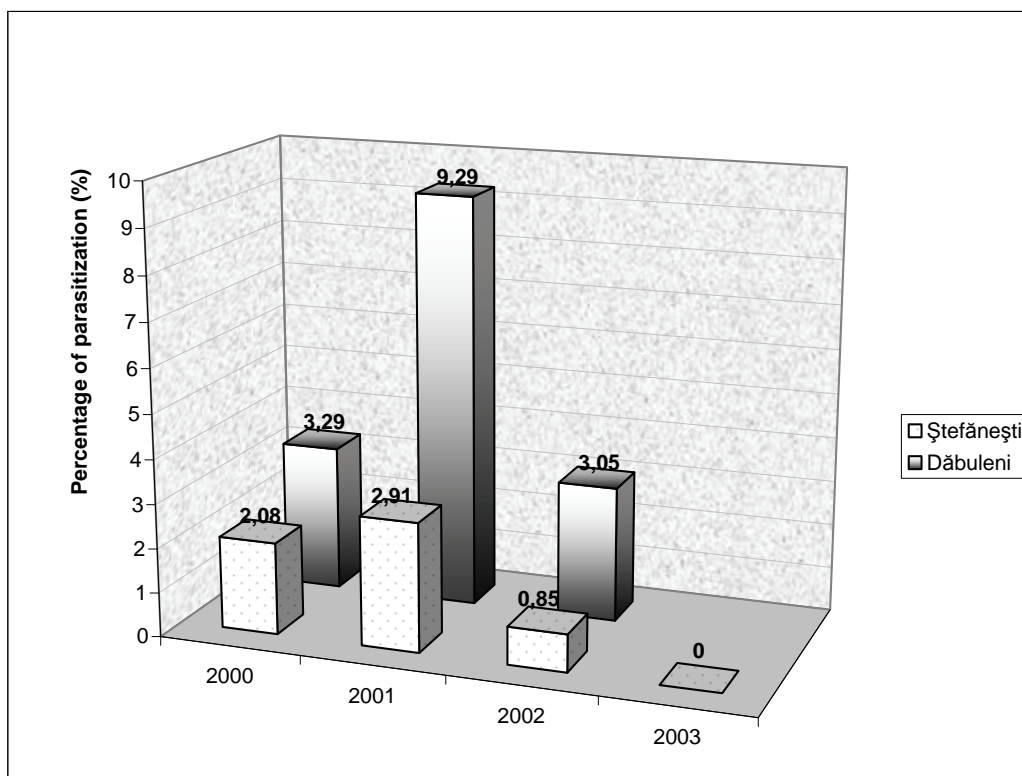


Figure 1. The role of *Goniozus claripennis* in parasitizing *Sparganothis pilleriana* caterpillars.

From the literature it appears that another host preferred by this parasitoid is *Eupoecilia ambiguella*, which grows well in moist and cool climate regions (TRJAPIȚĂN, 1978). Probably, parasitoid activity is also favoured by this climate. This behaviour would be supported by the higher parasitization percentages achieved in the two locations in

2001 (Fig.1), a year characterized by lower temperatures and high humidity.

On the contrary, in 2000 and 2002, years characterized by high temperatures and dryness, *G. claripennis* species had a lower participation in host parasitisation.

The absence of *G. claripennis* species in 2003 may be determined on the one hand, by the fact that high temperatures in May led to a rapid development of *S. pilleriana* larvae, so that young aged larvae preferred by the parasitoid were present a too short time to be parasitized, and on the other hand, the number of samples was insufficient to reveal the presence of the species.

CONCLUSIONS

Goniozus claripennis (Förster) is a primary, larval and gregarious ectoparasitoid, obtained from larval of *Sparganothis pilleriana* in two vineyards in southern Romania.

The number of the adults of *G. claripennis* that develop on a larva of *Sparganothis pilleriana* varies in keeping with the size of the host, as the mature hosts can provide as many as 10-11 individuals. In this study, 11 individuals of *G. claripennis* on the host larva is a new record.

The females are much more numerous than the males, so the sex-ratio has a sub-unit value: 0.29

The contribution of that parasitoid to the limitation of grape leaf-roller larvae is of 3.37%. The higher value of the parasitisation ratio (5.2%) was recorded in Dăbuleni vineyards, where the local climate is more favourable to the host.

The host-parasitoid relationship is new to Romania.

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