

**DIADEGMA GERMANICA HORSTMAN, 1973
(HYMENOPTERA: ICHNEUMONIDAE), AN IMPORTANT
PARASITOID OF GRAPE LEAF-ROLLER *SPARGANOTHIS
PILLERIANA* (DEN. ET SCHIFF.) LARVAE IN SOUTHERN
VINEYARDS OF ROMANIA**

**DIADEGMA GERMANICA HORST. (HYMENOPTERA:
ICHNEUMONIDAE), UN PARAZITOID IMPORTANT CU ROL ÎN
LIMITAREA POPULAȚIILOR MOLIEI FRUNZELOR VITEI DE
VIE, *SPARGANOTHIS PILLERIANA* (DEN. ET SCHIFF.), ÎN
UNELE PODGORII DIN SUDUL ROMÂNIEI**

BĂRBUCEANU DANIELA¹⁾, ANDRIESCU I.²⁾

¹⁾ University of Pitesti, ²⁾ „Al. I. Cuza” University of Iasi

Abstract. As a result of the rearing of grape leaf-roller *Sparganothis pilleriana* (Den. et Schiff) larvae collected in 1998, 2000-2003 from two vineyards, Ștefănești (Ag) and Dăbuleni (Dj), *Diadegma germanica* Horst. was obtained as a primary and solitary endoparasitoid. The host parasitizing begins at the end of April or in early May, depending on the local and annual climatic conditions. The flight of the adults of *D. germanica* resulting from larvae of *S. pilleriana* is deferred by cca. 10 days as against that of the butterflies of *S. pilleriana*. Sex-ratio has a sub-unit value: 0.64%. The contribution of that parasitoid to the limitation of grape leaf-roller larvae is 3.4%. The higher value of the parasitization ratio (11.84%) was recorded in Dăbuleni vineyards. The host-parasitoid relationship is new to science.

Rezumat. În perioada 2000-2003, în două regiuni viticole din sudul României, Ștefănești – Argeș și Dăbuleni – Dolj, au fost colectate și crescute în laborator larve de *Sparganothis pilleriana* (Den. et Schiff). În urma creșterilor, printre parazitoizii obținuți, s-a remarcat ichneumonidul *Diadegma germanica* Horst., un endoparazitoid primar, larvar și solitar. Specia a parazitat larve tinere, de vârstă a II- și a III-a, fiind prezentă în vie încă de la sfârșitul lunii aprilie, începutul lunii mai, în funcție de condițiile climatice locale și anuale. În cadrul complexului de parazitoizi al speciei *Sparganothis pilleriana* Den. et Schiff., parazitoidul a realizat un procentaj global de parazitare de 2,39%, situându-se pe locul 3 ca importanță, după *Brachymeria intermedia* (Nees) și *Nemorilla maculosa* (Meig.). Specia este mult mai activă în Dăbuleni decât în Ștefănești, procentajul de parazitare atingând 11,84%. Relația *Diadegma germanica* Horst. – *Sparganothis pilleriana* (Den. et Schiff.) este nouă pentru știință.

After the ovophagous parasitoids, those of the young larvae have a major significance in reducing the populations of a large number of agricultural pests, as the latter have a contribution to annihilating the host, before it can cause significant damage. Such a parasitoid is *Diadegma germanica* Horst. There are in the literature few data regarding its role in reducing the pest populations. Like

other species belonging to the genus *Diadegma*, this is a primary, larval and solitary endoparasitoid (Mills and Carl, 1991). In Romania, the species is noted for the first time by Diaconu (1999), who obtains a ♀ out of a larva of *Hedya pruniana* Hb. (Tortricidae) collected in the village Crăcăoani (NT).

MATERIAL AND METHODS

The observations were carried out in two vineyards in southern Romania, viz. Ștefănești and Dăbuleni. The vineyards of Ștefănești, located in the central southern region of the Wallachian hills, and characterized by a rather wet and cool climate, presents a small *Sparganothis pilleriana* (Den. et Schiff.) population. 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 host larvae were done over the period of activity of the host, i.e. May to July, in the years 1998, 2000-2003. The caterpillars were reared in isolation up to the apparition of tortricid or parasitoid adults, their food being the vine leaves. 28 individuals of *Diadegma germanica* Horst. were produced under laboratory conditions.

RESULTS AND DISCUSSIONS

The species *Diadegma germanica* Horst. is obtained for the first time out of larvae of *Sparganothis pilleriana* (Den. et Schiff.).

As other species of *Diadegma*, the present one parasitizes young larvae, and the parasitized caterpillar continues its development without seeming to be affected by the presence of the parasitoid (Bărbuceanu, 2007).

After the larva of *D. germanica* reaches its complete stage of development, it begins to wave its cocoon, without however getting away from the remains of the parasitized larva.

At the beginning, the cocoon is coloured uniformly, but after cca. 24 hours a median transversal ring appears, of a darker colour. The cocoon is oblong, of a regular shape, and its size has seen a variation during the period of the study, from 4 mm to 6 mm in length, and from 1.5 mm to 2 mm in breadth.

The colour of the cocoons under observation has varied from a transparent shade of whitish-cream to cream, and cream-brownish, even black in a cocoon collected in Ștefănești, in the year 2003.

The outer shell of the cocoon is made up of two layers, one internal, of significant substance, and of a darker colour and another one, placed outwardly, and made up of a slighter fabric of whitish-cream silky threads, which give further nuances shades to the cocoon's colour. The median ring is narrow and, as a rule, rather clearly coloured.

Out of the smaller cocoons, which were on average as big as 4.96/1.73 mm, the males hatched, and out of the larger cocoons, sized from 5.18 mm to 1.81 mm, merged the females, which are normally bigger than the males.

The eclosion of the adults' takes place through an opening located in a terminal area, sometimes slightly laterally, having more or less jagged sides.

The parasitoid's period of activity

The parasitoid is present in the vineyards as early as the end of April and the beginning of May, in keeping with the local and annual climatic conditions.

In the vineyard at Dăbuleni, in the conditions of the year 2000, the first parasitized larvae of *S. pilleriana* Den. et Schiff. were collected on the 9th May; the parasitoid was also present in the cocoon stage, which means that the parasitizing occurred in the latter half of April; the larvae of *S. pilleriana* Den. et Schiff. collected on the 26th May were parasitized as well. In 2002, the first parasitized larvae were collected on the 27th May.

The flight of the adults of *D. germanica* which resulted from the larvae of *S. pilleriana* collected in the year 2000 at Dăbuleni was extended over the period 22 May – 9 June, so the whole duration was of nearly three weeks. The flight of the parasitoid was deferred by cca. 10 days, as compared to that of the butterflies of *S. pilleriana* (Fig. 1).

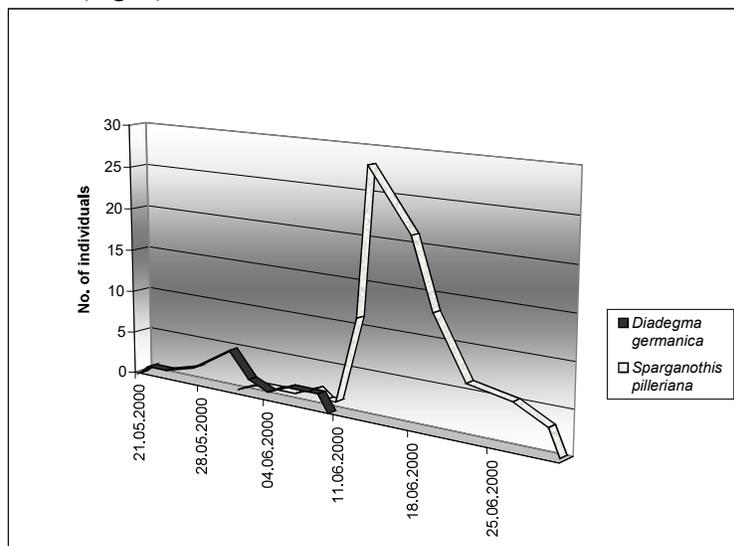


Fig. 1. The dynamics of the occurrence of the adults of *Diadegma germanica* Horst. and *S. pilleriana* (Den. et Schiff.) out of caterpillars collected at Dăbuleni, in 2000

In the location of Ștefănești, the parasitized larvae of *S. pilleriana* (Den. et Schiff.) were collected on the 19th May and 4th June 2002, and on the 1st June 2003 the parasitoid was also collected in the cocoon stage. It seems that the parasitizing of the young larvae occurred over the month of May; the adults hatched on the 13rd June 2002.

Fed on sugar syrup, the adults of *Diadegma germanica* Horst. lived for 7-20 days.

Sex-ratio

In 2000, in Dăbuleni 18 specimens of *D. germanica* were obtained out of larvae of *S. pilleriana*, out of which 7 ♂♂ and 11 ♀♀. The sex-ratio has a sub-unit value: 0.64% (Fig. 2)

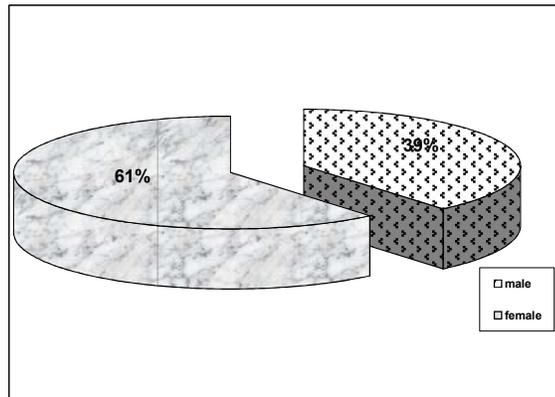


Fig. 2. Sex ratio of *Diadegma germanica* obtained from *Sparganothis pilleriana* (Den. et Schiff.) caterpillars - Dăbuleni, in 2000

The importance of the species in reducing the host larvae

The fact that the species attacks young larvae accounts for its being extremely valuable in reducing the populations of *Sparganothis pilleriana* (Den. et Schiff.).

The parasitoid achieved a global percentage of parasitizing the larvae of *Sparganothis pilleriana* Den. et Schiff. of 3.4% (Table 1). In Dăbuleni, the parasitizing percentage was of 4.96%.

The species was come across in the years 2000 and 2002, its presence being more visible in the year 2000, when it was the main larvar parasitoid, contributing to annihilating the larvae in a proportion 11.84%; in the year 2002, the percentage of parasitizing of *S. pilleriana* Den. et Schiff. larvae was 2.29% (Fig. 3).

In Ștefănești, the activity of the species was more reduced, and the global parasitizing percent achieved was of 1.75%. *D. germanica* Horst. was obtained only in the years 2002 and 2003, and the parasitizing percentages of the larvae recorded low values (Fig. 4). Its absence in the other years was probably due to the small number of samples, or its preference for other hosts.

Table 1

The role of *D. germanica* in reducing of *S. pilleriana* (Den. et Schiff.) larvae

Locality	Year	No. of larvae collected	No. of larvae parasitized	%	<i>Diadegma germanica</i>	
					No.	%
Ștefănești (AG)	1998	24	4	16.67	-	-
	2000	48	9	18.75	-	-
	2001	103	10	9.71	-	-
	2002	118	13	11.02	4	3.39
	2003	107	24	22.43	3	2.80
Subtotal		400	60	15	7	1.75
Dăbuleni (DJ)	2000	152	33	21.71	18	11.84
	2001	140	31	22.14	-	-
	2002	131	13	9.92	3	2.29
Subtotal		423	77	18.2	21	4.96
Total		823	137	16.65	28	3.4

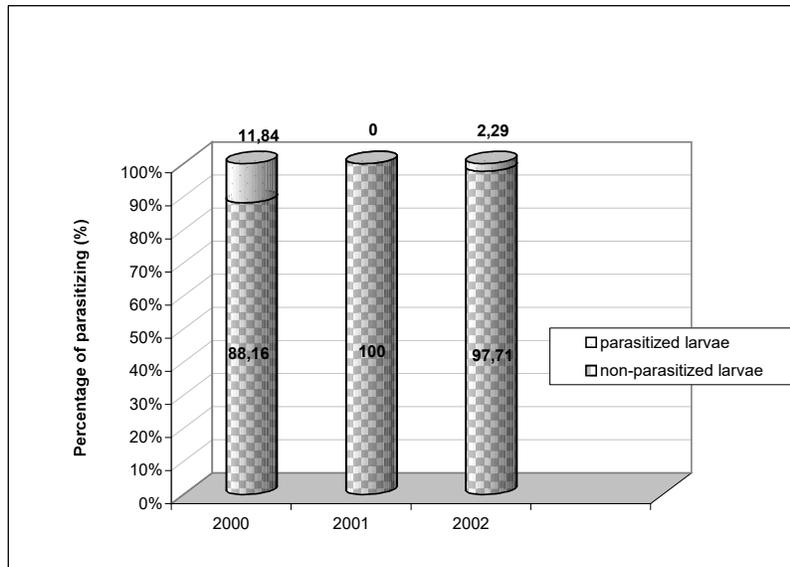


Fig. 3. The percentage of parasitizing of *Sparganothis pilleriana* caterpillars by *Diadegma germanica* Horst., in Dăbuleni

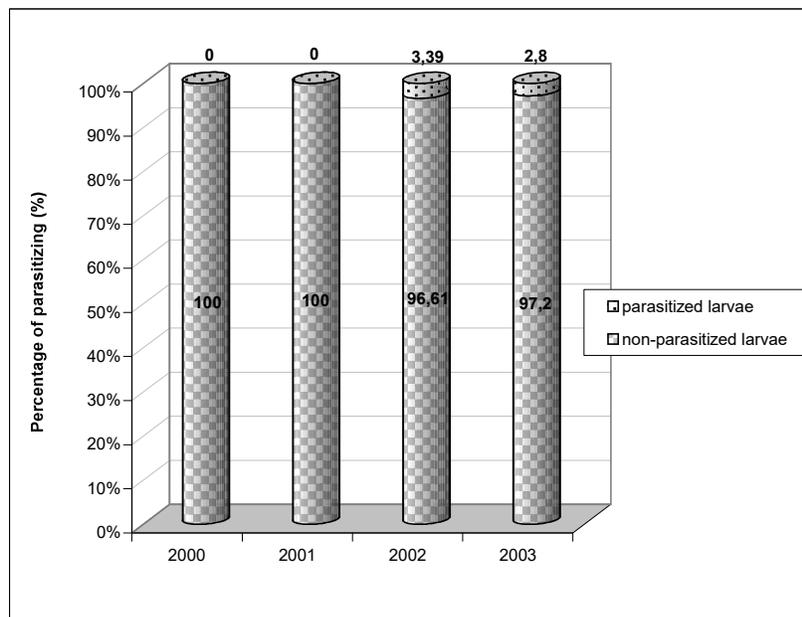


Fig. 4. The percentage of parasitizing of *Sparganothis pilleriana* caterpillars by *Diadegma germanica* Horst., in Ștefănești

CONCLUSIONS

The fact that the species attacks young larvae makes it a highly valuable in reducing the populations of *Sparganothis pilleriana* Den. et Schiff.

The host parasitizing begins in the end of April or in the early of May, depending on the local and annual climatic conditions.

The flight of the adults of *D. germanica* resulting from larvae of *S. pilleriana* was deferred by cca. 10 days as compared to that of the butterflies of *S. pilleriana*.

The sex-ratio recorded a sub-unit value, i.e. 0.64%.

The contribution of that parasitoid to the limitation of the grape leaf-roller larvae is of 3.4%.

The species was much more active in Dăbuleni, where a value of 11.84% was recorded in parasitizing the larvae.

The *Diadegma germanica* Horst. – *Sparganothis pilleriana* (Den. et Schiff.) relationship is new to science.

ACKNOWLEDGEMENTS

We wish to express our sincere thanks to Professor Constantin Pisciă, PhD of the “Al. I. Cuza” University of Iași, the Faculty of Biology, who identified the *Diadegma germanica* species.

REFERENCES

1. **Bărbuceanu Daniela, 2007** - *Diadegma* species (Hym.: Ichneumonidae) which parasitized the grape leaf-roller *Sparganothis pilleriana* Den. et Schiff. (Lep.: Tortricidae) in Southern vineyards of Romania. Scientific Papers USAMV, Horticulture, seria B, vol. L, București: 440-445
2. **Diaconu A., 1999** – *Contribuții la studiul complexelor parazitare (Insecta) ca factori de reglare ai populațiilor de tortricide foliofage (Insecta: Lepidoptera, Tortricidae) dăunătoare pomilor fructiferi*. Teză de doctorat, Facultatea de Biologie, Univ. “Al. I. Cuza” Iași
3. **Mills N., J. and Carl K., P., 1991** - *Natural Enemies and Pathogens*. În Geest van der, L.P.S. & Evenhuis, H.H., *Tortricid pests their biology, natural enemies and control*, World Crop Pests, 5: 235-252
4. **Pisciă C., 2001** – *Ichneumonidele (Hymenoptera, Insecta) din România și gazdele lor*. Catalog, Ed. Univ. “Al. I. Cuza”, Iași, pp. 406.