

## PARASITOID WASPS AND THEIR INFLUENCE ON FOREST PEST POPULATIONS

### VIESPI PARAZITOIDE ȘI INFLUENȚA LOR ASUPRA POPULAȚIILOR DE DĂUNĂTORI FORESTIERI

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**Abstract.** Parasitoid wasps are very important in reducing populations of little spruce sawfly (*Pristiphora abietina* Christ.), yearly percent of affected cocoons being between 23 and 35,2%. In laboratory conditions, 23% from the monitored cocoons was affected by parasitoid wasps, the largest share being owned by ichneumonids (19%). Was identified 2 new species of ichneumonids for Romania fauna (*Mesoleius ruficollis* Holmgren and *Ctenochira flavicauda* Roman). It is necessary to be made researches in this domain, to know better the parasitoid complex and the significant importance in pest control and the protective measures which must be adopted by the forest management.

**Key words:** parasitoid, little spruce sawfly, ichneumonids.

**Rezumat.** Viespile parazitoide joacă un rol important în reducerea populațiilor viespii mici cu fierăstrău a acelor de molid (*Pristiphora abietina* Christ.) procentul anual de parazitare al coconilor variind între 23 și 35,2%. În condiții de laborator, 23% dintre coconii monitorizați au fost parazitați, ponderea cea mai mare fiind deținută de ichneumonidae (19%). Au fost identificate 2 specii noi de ichneumonidae pentru fauna României (*Mesoleius ruficollis* Hlgh. și *Ctenochira flavicaudata* Rom.). Sunt necesare cercetări cu privire la importanța și influența parazitoizilor asupra populațiilor de dăunători forestieri precum și a măsurilor de protecție a acestora ce trebuie adoptate de managementul forestier.

**Cuvinte cheie:** parazitoid, viespea mică cu fierăstrău a acelor de molid, ichneumonidae

## INTRODUCTION

Parasitoid wasps play a very important role to keep under control the insects which produce damages in the forest and are one of the most important biotic limitative factor (Ceianu *et al*, 1965; Pisciă, 1980; Brudea, 2007). Knowing of this species is very important for the forest ecosystems management and theirs protection. The necessity of studies regarding the parasitoid contributions to the reduction of forest pest level is represented by the fact that in many cases, predicted damages was under estimated level, which reinforces the hypothesis that the activity of mortality factors is very high, among them being also and parasitoid insects (Mráček, 1994; Ceianu *et al* 1965, Brudea & Pei 2006).

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## MATERIAL AND METHOD

As a case study for the activity of parasitoid wasps and the influence on pest populations, pupa (cocoon) stage of little spruce sawfly *Pristiphora abietina* Christ. (O. Hymenoptera, F. Tenthredinidae) was chosen.

The research has been carried out in the Eastern Carpathians, in the group of Stâniș oara Mountains, Suceava county, Boroaia administrative unit, forest management unit Fălticeni, on a surface of 856,70 ha, for a period of three years.

To collect cocoons, 32 soil samples/year were taken (25/25/10 centimeters) from the spruce/mixed forest (proportion of spruce over 50%), where the little spruce sawfly *Pristiphora abietina* Christ. was present. Sorting of the cocoons was made according with specific exit orifices (Stănescu, 1962; Ceianu, 1965) (tab. 1) (fig. 1).

Table 1

Elements used to sort the cocoons affected by parasitoids (Stănescu, 1962)

Particularity of the specific exit orifices	Probable cause
Cocoons with a small, round orifice	Ichneumonidae
Cocoons with several small, round orifices	Chalcidoidea
Cocoons with very shiny internal walls	Diptera

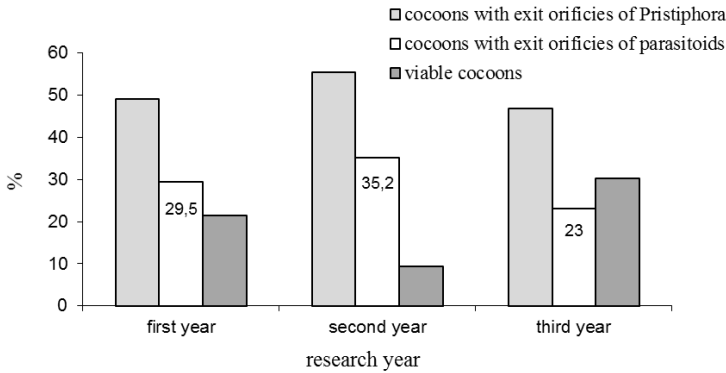
For the observations regarding the exit of the insects from the cocoons (*Pristiphora abietina* Christ. and parasitoids), 50 of healthy cocoons was selected and monitored in laboratory conditions. The parasitoid wasps was identified by Prof. Dr. Ionel Andreiescu and Prof. Dr. Constantin Pisciă (†) ("AL. I. Cuza" University, Iași).



Fig. 1 Specific exit orifices

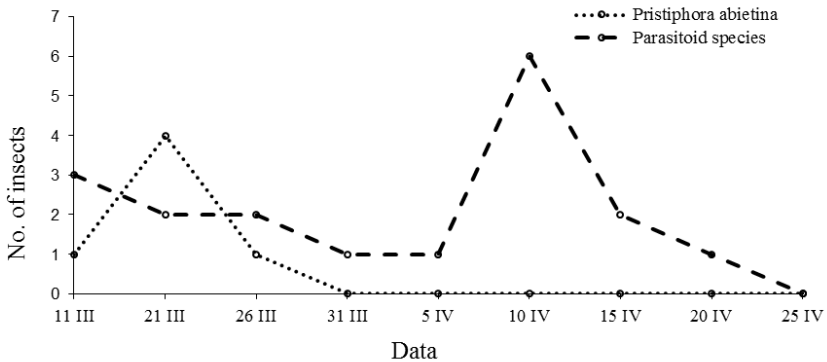
## RESULTS AND DISCUSSIONS

After analyzing collected cocoons which were presenting specific leaving orifices by the parasitoid wasps, parasitization ratios of 29.5% (first year), 35.2% (second year) and 23% (third year) (fig. 2) were observed.



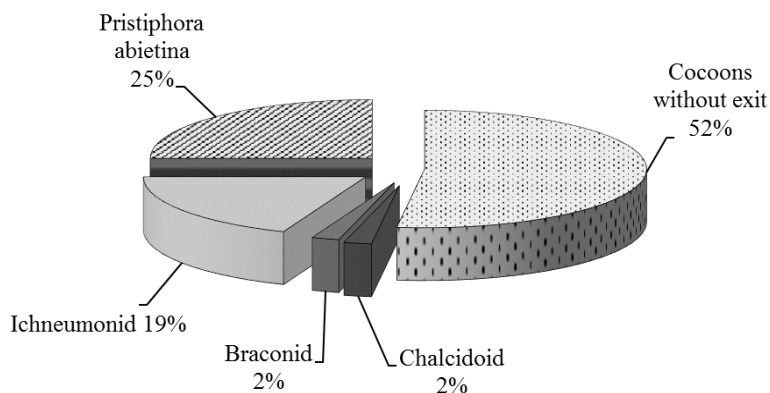
**Fig. 2** Proportion of cocoons (*Pristiphora abietina* Christ.) affected by parasitoids

For the cocoons monitored in laboratory conditions, hatching of the parasitoids occurred for a longer period than the adults of *Pristiphora abietina* Christ. (fig. 3), maximum having place in the first decade of April. Even that the observations was made in the laboratory conditions, was possible to identify the moment of the hatching for the main parasitoid wasps in comparison with little spruce sawfly adults.



**Fig. 3** Dynamic of the hatching from cocoons for adult insects (laboratory conditions)

Our research showed that the presence of parasitoid wasps in the cocoons was in proportion of 23%. Of this proportion, 2% were chalcidoids, 2% braconids and 19% ichneumonids (fig. 4).



**Fig. 4** Main parasitoids wasps obtained (laboratory conditions)

**Chalcidoids wasps:** was obtained a species of genus *Tritneptis* (fig. 5);, Suprafamily *Chalcidoidea*, Family *Pteromalidae*, that was represented by 6 females, 1 male and 1 larva. At the moment of the study this species don't was identified because are missing recent reviews, the key for identification used in Europe is from 1969, contains only three species of the genus, obtained species does not fit into them.



**Fig. 5** Chalcidoid wasps – *Tritneptis* sp.

**Braconid wasps:** has been identified just de family, at the moment of the study don't was identified the species.

**Ichneumonid wasps:** a total of 8 species were identified, from 5 subfamilies (*Banchinae*, *Cryptinae*, *Ctenopelmatinae*, *Mesochorinae* and *Tryphoninae*) (tab. 2). The species *Mesoleius ruficollis* Hlgh. and *Ctenochira*

*flavicauda* Rom. are new in Romania. *Pristophora abietina* Christ. is the new host species in Romania for species: *Agrothereutes abbreviatus* F., *Mesoleius ruficollis* Hlgr. *Lissonota folii* Thoms., *Endasys analis* Thoms., *Endasys brevis* Grav., *Endasys testaceus* Taschb., *Mesochorus brevipetiolatus* Ratzb. and *Ctenochira flavicauda* Rom.

Table 2

Ichneumonid wasps obtained from *Pristophora abietina* Christ. cocoons

Family	Subfamily	Species
Ichneumonidae	Banchinae	<i>Lissonota folii</i> Thomson
	Cryptinae	<i>Agrothereutes abbreviatus</i> Fabricius
		<i>Endasys analis</i> Thomson
		<i>Endasys testaceus</i> Taschenberg
		<i>Endasys brevis</i> Gravenhorst
	Ctenopelmatinae	<i>Mesoleius ruficollis</i> Holmgren
	Meschorinae	<i>Mesochorus brevipetiolatus</i> Ratzeburg
Tryphoninae	<i>Ctenochira flavicauda</i> Roman	

## CONCLUSIONS

1. The proportion of *Pristiphora abietina* Christ. cocoons which was affected by parasitoid wasps was between 23% and 35,2% per year, what it proves an intense activity of the parasitoids.

2. Maximum level of the parasitoids adults hatching is registered at 20 days after maximum level of the *Pristiphora abietina* Christ. (laboratory conditions).

3. The most important parasitoid wasps are represented by ichneumonids (19%).

4. Was identified 8 species of ichneumonids, 2 species are new to Romania fauna (*Mesoleius ruficollis* Holmgren and *Ctenochira flavicauda* Roman).

5. It is necessary to be made researches in this domain, to know better the parasitoid complex and the significant role in pest control.

6. Forest management must take in consideration the protection of parasitoid insects populations and the importance of biodiversity (mixed forest, areas with grass vegetation, floral trees, grazing ban).

## REFERENCES

1. Brudea V., 2007 – *Combaterea biologică în Managementul Integrat la Insectelor Dăunătoare, cu referire special la ecosistemele silvice*. Editura Universității Suceava, p. 240.
2. Brudea V., Pei G., 2006 – *Bioecology and control researches concerning the little spruce sawfly *Pristiphora abietina* Christ (Hymenoptera: Thentredinidae)*. Analele

Științifice ale Universității "AL. I. Cuza" Iași, secțiunea Biologie Animală, Tom LII, p. 131-136.

3. **Brudea V., Pei G., 2006** – *Viespea acelor de molid*. Revista Sănătatea Plantelor, p. 41.
4. **Ceianu I., Mihalache Gh., Balinschi I., 1965** - *Combaterea biologică a dăunătorilor forestieri*. Editura Agrosilvică, București, p. 225.
5. **Mráček Z., 1994** - *Steinernematids and their natural web-spinning sawfly hosts in forest ecosystems – a historical outline*. Institute of Entomology, Branišovská, p. 50.
6. **Pisică C., Brudea V., 2011** – *Speciile de ichneumonide (Hym., Ichneum.) care parazitează viespea acelor de molid *Pristiphora abietina* (Christ) (Hym. Tenthredinidae) în nord-estul României*. Volumul de lucrări al simpozionului "Biodiversitatea și managementul insectelor din România", Editura Universității "Ștefan cel Mare" Suceava, p. 137-141.
7. **Olenici N., 2005** - *Pristiphora abietina* (Christ) (Hymenoptera, Tenthredinidae) - *un dăunător important al molidului din afara arealului natural de vegetație*. Revista Pădurilor, Anul 120, Nr. 1, p. 3-12.