

# The influence of parasites on harmful insects of the deciduous forests of the north of Argeş county

Romeo Retevoi

University of Sciences, Piteşti, Romania.

**Abstract.** This article presents a study on the parasites of harmful insects of the acacia and oak forests from the superior basin of Doamnei river. Between 2008-2011, we identified in these forests the following species of harmful insects which have significantly multiplied: *Parectopa robiniella*, *Phylonorycter robiniella*, *Andricus quercuscalicis*. The dynamics of pests populations was influenced both by abiotic factors and by the action of parasites.

**Key Words:** *Parectopa robiniella*, *Phylonorycter robiniella*, *Andricus quercuscalicis*, parasites.

**Copyright:** This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

**Corresponding Author:** R. Retevoi, reteik@yahoo.com

## Introduction

*Parectopa robiniella* and *Phylonorycter robiniella* are leaf-mining insects of the acacia, spread in the majority of the European countries (Csoka 1999; Šefrová 2002; Neţoiu & Tomescu 2006). Studies performed in Serbia by Stoianović & Markoević (2005) have shown the existence of 23 species of main and secondary parasites for *Parectopa robiniella* and *Phylonorycter robiniella*, with a parasitisation rate of up to 50%. In Hungary, Csoka *et al* (2009) identified 19 species of parasites. In Romania, studies performed by Ureche (2006) in the acacia forests of Galaţi and Bacău counties have shown the existence of two parasites *Minotetrascicus frontalis* Nees and *Closterocerus formosus* Westw. *Andricus quercuscalicis* is a gall wasp which attacks the oak fruit. The studies performed by Schönrogge *et al* (1995) on the *Andricus quercuscalicis* species, have shown the presence of a lot of parasites to this species of the families Eulophidae and Pteromalidae. The parasitisation rates have different values according to sites, namely between 0.4-63.1%.

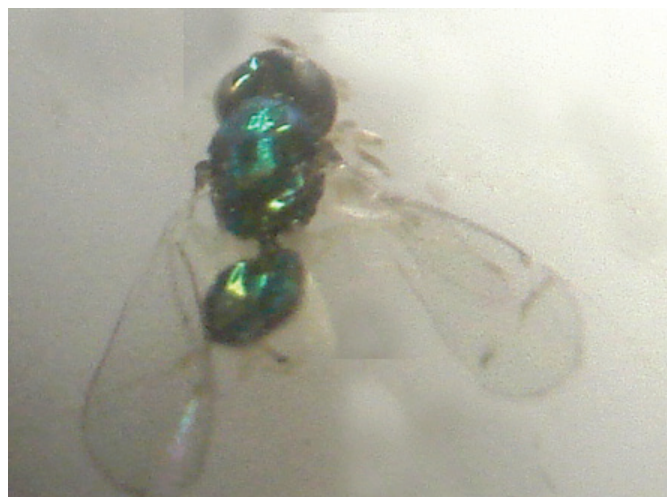
## Materials and Methods

The research on the harmful insects of the acacia forests and their parasites was performed in the acacia forests of Retevoieşti, Domneşti and Nucşoara, between 2008-2011. In these acacia forests, there were delimited sample areas sized to 400 m<sup>2</sup>. The samples were collected along the diagonal of the square sample, at random. The branches were collected from the lower third of the crowning and there the individuals of the first 10 leaves were counted starting from the top of the branches. The smear method of the samples is similar to those used in other European regions (Povilas & Jolanta 2008; Csoka *et al* 2009). In order to identify the parasites existence at *Parectopa robiniella* and *Phylonorycter robiniella* in 2010, there were collected folioles

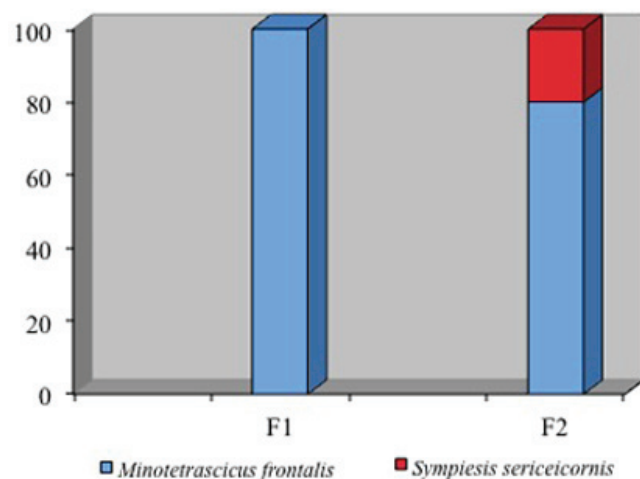


**Figure 1.** *Sympiesis sericeicornis* (top) and *Minotetrascicus frontalis* (bottom)

(200 folioles from each collection station) with larvae in their last stage and they were put by 25 in plastic boxes. The boxes were kept at room temperature (18-20°C). In the oak forests of the hilly area of Pietroşani commune there was identified the



**Figure 2.** *Pediobius saulis*

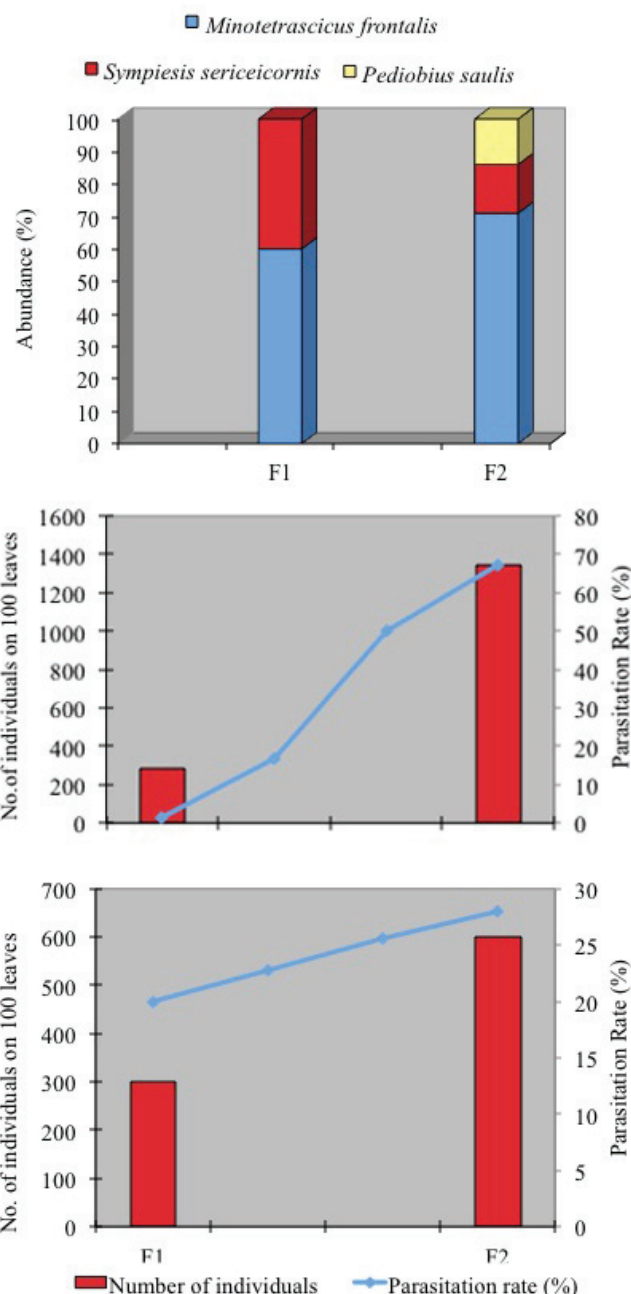


**Figure 3.** The relative abundance of the two parasites in 2010 at *Parectopa robiniella*, in Retevoiești

species *Andricus quercuscalicis*. In September-October period, there were gathered attacked acorns on the sample areas (with the asexual generation) sized to one square metre. In order to study adults and to identify the presence of parasites, we introduced 25 galls each in glass containers.

## Results and Discussion

In the eight batches, beside *Parectopa robiniella*, there were identified two species of parasites, namely *Sympiesis sericeicornis* (Figure 1, top) and *Minotetrascicus frontalis* (Figure 1, bottom). The abundance of the two parasites at *Parectopa robiniella* in the two generations is represented in figure 3. Following this chart, we notice that the dominant species is *Minotetrascicus frontalis*, whereas *Sympiesis sericeicornis* appeared during the second generation. The parasitization rate for *Parectopa robiniella* is presented in figure 4, top. Following this chart, we notice that the parasitization rate is reduced, having the value of 0.5 % during the first generation and of 5% during the second generation. In Domnești place (situated at 9 km north from the Retevoiești), the parasitization rates don't differ significantly. In



**Figure 4.** The relative abundance of the 3 parasites at *Phylonoxycter robiniella* in 2010, in Retevoiești (top); parasitization rate for *Parectopa robiniella* (middle); the parasitization rate for *Phylonoxycter robiniella* (bottom).

Nucșoara place (situated at 22 km north from Retevoiești), the parasitization rates had low values. The second generation had a parasitization rate of 0.3%.

In the eight batches, besides *Phylonoxycter robiniella*, there were identified three species of parasites *Sympiesis sericeicornis* namely *Minotetrascicus frontalis* and *Pediobius saulis* (Figure 2). The abundance of the 3 parasites at *Phylonoxycter robiniella* during the two generations (F1, F2) is represented in figure 4, middle.

Following this chart, we notice that the dominant species is *Minotetrascicus frontalis* whereas *Sympiesis sericeicornis*



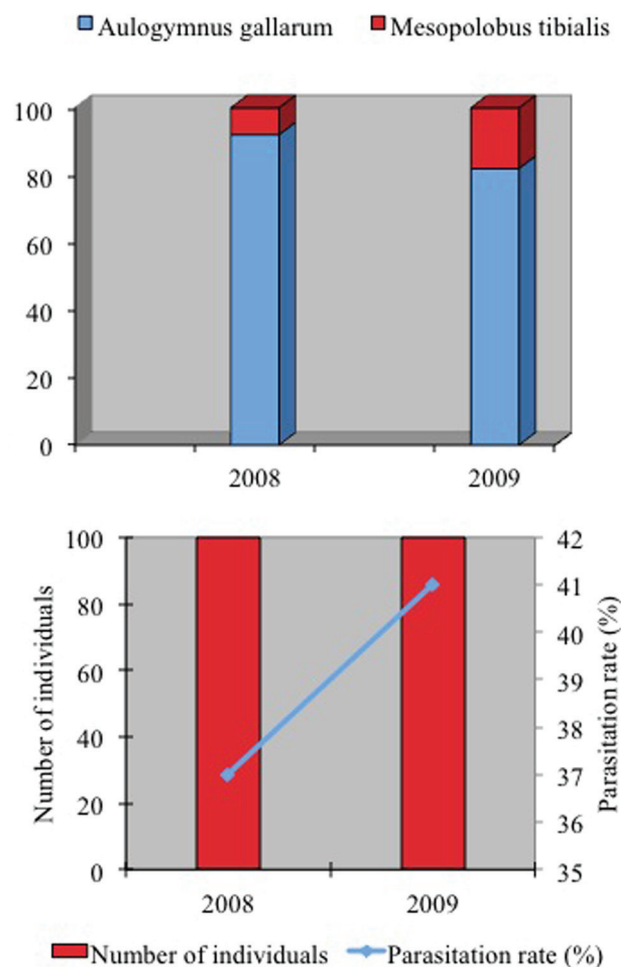


**Figure 5.** Parasite species at *Andricus quercuscalicis* - *Mesopolobus tibialis* (top) *Aulogymnus gallarum* (bottom).

appeared during both generations. Following the figure 4, bottom chart, we notice that the parasitization rate is of 20% during the first generation and of 28% during the second generation. Comparing the parasitization rates of the two species, we notice that in the case of *Phylonycter robiniella*, this has higher values. In Domnești place, the parasitization rate for the second generation was of 24%, and in Nucșoara place, the parasitization rate was of 8%. The parasitization lower rate can be also explained by the low number of individuals of *Phylonycter robiniella* on the leaves. If in Retevoiești and Domnești, the average number of individuals on leaves was 6, in Nucșoara place, the average number of individuals on leaves was of 1.1.

In the region studied on, we identified 2 parasites at *Andricus quercuscalicis*: *Aulogymnus gallarum* and *Mesopolobus tibialis* (Figure 5). The abundance of the two parasites at *Andricus quercuscalicis* during the two years of study is represented by the chart in figure 6, top. Following this chart, we notice that the dominant species is *Aulogymnus gallarum*. The parasitization rate (Figure 6, bottom) represents the percentage of the parasites present in one hundred pupae rooms.

In 2008, the parasitization rate had a high value (37%), causing, together with other factors, a high mortality within the population. In 2009, the oak fructification was 70% lower than in



**Figure 6.** The relative abundance of the two parasites for the 2008 and 2009 generations in Pietroșani commune (top); the parasitization rate of *Andricus quercuscalicis* for asexual generations in 2008 and 2009 in Pietroșani commune (bottom).

2008. 34% of these acorns remained unattacked, compared to year 2008, when only 1.6 % of the fructification remained unattacked. The 2 parasites contributed to a significant diminution of the *Andricus quercuscalicis* population. If in 2008, in the sample areas there was an average number of 105 galls on sq.m, in 2010, their number was reduced to 12 galls per square metre.

## Conclusions

As a result of the research conducted on parasites it can be noticed that the species *Parectopa robiniella* and *Phylonycter robiniella* had different rates of parasitization, even if they occupy the same ecological niche. In 2010, the parasitization rates of the species *Parectopa robiniella*, were reduced compared to *Phylonycter robiniella*. At an average number of 13.4 individuals on leaf (during the second generation), *Parectopa robiniella* had a maximum rate of parasitization of 5%, which didn't influence significantly the population multiplication. The coefficient of the population multiplication in 2011 was 1.2, having a value similar to that of 2010 (1.4) and 2009 (1.1). The parasitization rate at *Phylonycter robiniella* influenced the numeric population multiplication. During years 2008, 2009 and 2010, we noticed a multiplication by two of the individuals' number by leaf, at every generation. In 2010, during the second

generation, the population had a medium number of 6 individuals by leaf, and in 2011, the population had an average number of 6.8 individuals by leaf. The species *Aulogymnus gallarum* and *Mesopolobus tibialis* contributed to the numeric diminishing of *Andricus quercuscalicis* population. In 2008, 98% of the acorns were attacked, and in 2010, the acorns percentage was 24%.

## References

- Csoka, G., 1999. Recent invasion of five species of leaf mining Lepidoptera in Hungary, in: Liebhold, A. M., McManus, M. L., Otvos, I. S., Fosbroke, S. L. C. (eds), Proceedings integrated management and dynamics of forest defoliating insects, 15-19 August, Victoria, BC. Gen. Tech. Rep. NE-277, Newtown Square, PA: USDA, Forest Service, Northeastern Research Station, pp. 31-36.
- Csoka, G., Pénze, Z., Hirka, A., Miko, I., Melika, G., 2009. Parasitoid assemblages of two invading black locust leaf miners, *Phyllonorycter robiniella* and *Parectopa robiniella* in Hungary. Periodicum Biologorum 57:405–411.
- Nețoiu, C., Tomescu, R., 2006. Moliile miniere ale salcâmului (*Parectopa robiniella* Clemens – 1863 și *Phyllonorycter robiniella* Clemens - 1859, Lepidoptera, Gracillariidae). Analele ICAS 49:119-131.
- Povilas, I., Jolanta, R., 2008. Records of *Phyllonorycter robiniella* (Clemens, 1859) and *Parectopa robiniella* Clemens, 1863 (Lepidoptera, Gracillariidae) in Lithuania. Acta Zoologica Lituanica 18(2):130-133.
- Schönrogge, K., Graham, N. S., Crawley, M., 1995. Spatial and temporal variation in guild structure: Parasitoids and inquilines of *Andricus quercuscalicis* (Hymenoptera: Cynipidae) in its native and alien ranges. Oikos 72:51-60.
- Šefrová, H., 2002. *Phyllonorycter robiniella* (Clemens, 1859) – egg, larva, bionomics and its spread in Europe. Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis 3:7–12.
- Stojanović, A., Marković, C., 2005. Parasitoid complex of *Phyllonorycter robiniella* (Clemens, 1859) (Lepidoptera, Gracillariidae) in Serbia. Journal of Pest Science 78:109-114.
- Ureche, C., 2006. Invasive leaf miner insects in Romania. IUFRO Working Party, pp. 259-262.

## Author

•Retevoi Romeo, University of Sciences, Romania, Argeș country, Pitești, Târgul din vale Street, No. 1, e-mail reteik@yahoo.com

**Citation** Retevoi, R., 2012. The influence of parasites on harmful insects of the deciduous forests of the north of Argeș county. Advances in Environmental Sciences. 4(1):1-4.

**Editor** I. Valentin Petrescu-Mag

**Received** 05 January 2012

**Accepted** 27 January 2012

**Published Online** 15 April 2012

**Funding** None Reported

**Conflicts / Competing Interests** None Reported