

PERSPECTIVES ON THE BIOLOGICAL CONTROL OF *Cameraria ohridella*



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FIGURE 1: Adult of the horse chestnut leaf-miner, *Cameraria ohridella*.

Introduction

Invasive pest

The horse chestnut leaf-miner, *Cameraria ohridella* Deschka et Dimic (Fig. 1) is an important invasive lepidopteran pest of *Aesculus hippocastanum* spreading in Europe. Since its first record in Macedonia in 1985 it rapidly spread and colonized major parts of Europe including Denmark, south of Sweden, Belorussia and Ukraine.

Damage

C. ohridella overwinters as pupa in decaying leaves under the canopy of the *Aesculus* trees. The larvae feed on leaf parenchyma (Fig. 2) and at their high density the damages can result in the tree growth reduction.



FIGURE 2: Larva of *C. ohridella* in a mine.

Pest control

Present methods of its control are based on application of non-selective insecticides and composting or burning of leaf litter. Since these methods also kill beneficial organisms including natural enemies of *C. ohridella*, new environment-friendly approaches need to be developed.

Aim

The aim of our research project is to explore natural enemies as potential candidates for biological control of this pest. In our study we focus on:

1. The impact of parasitoids on *C. ohridella* in the Czech Republic.
2. Searching for entomopathogenic fungi associated with this pest.

Materials and Methods

Damage level The horse chestnut leaves infested by *C. ohridella* were sampled at six localities in the Czech Republic (Fig. 3) when adults of the second generation started to emerge. The damage level was estimated visually (Gilbert & Grégoire, 2003).

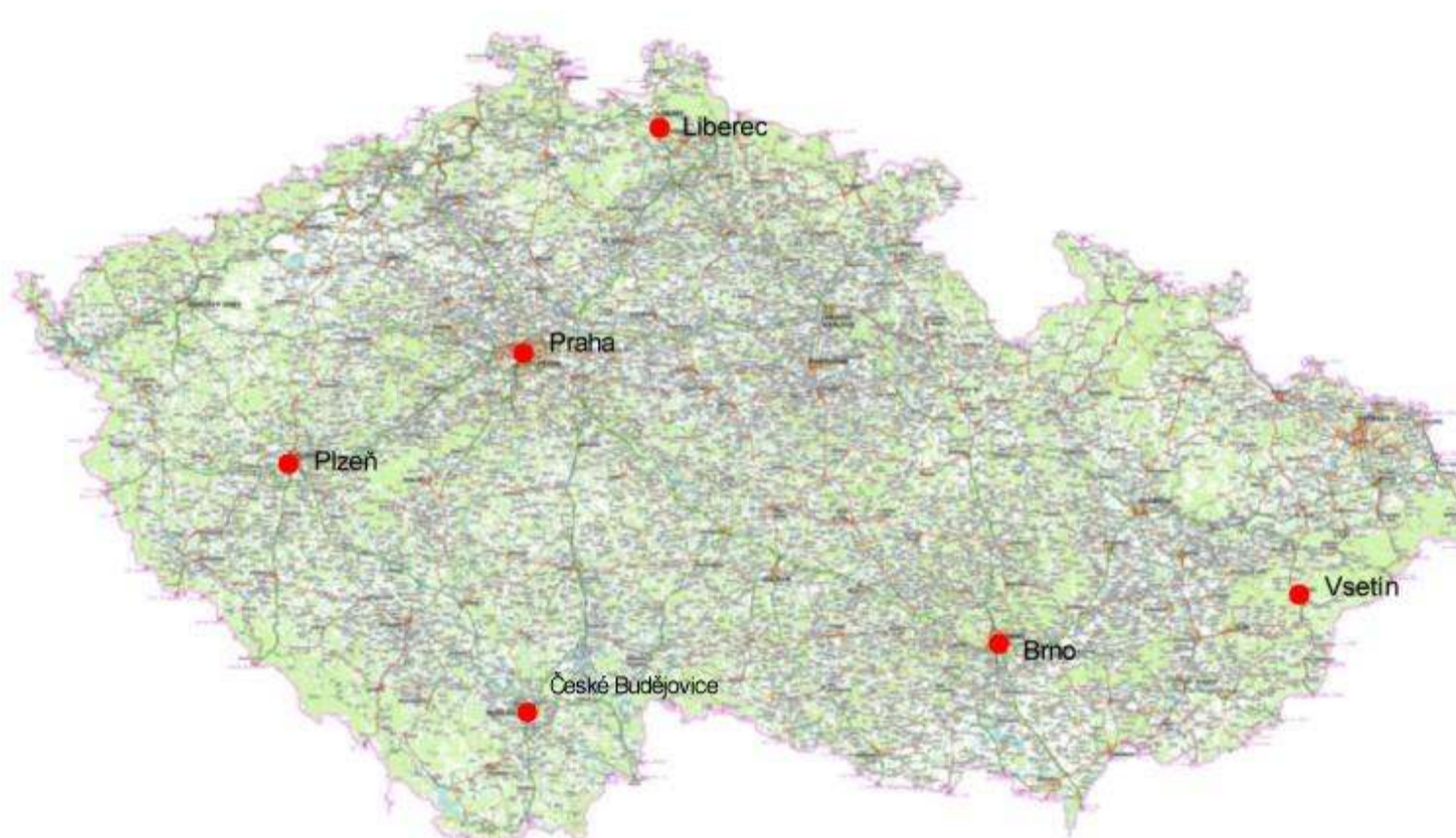


FIGURE 3: Map of the Czech Republic with indicated cities where leaf samples were collected.

Parasitoids Leaves were dissected and state of larvae or pupae was recorded. Parasitized larvae and pupae were stored at laboratory conditions and emerged adult parasitoids were determined.

Entomopathogenic fungi The occurrence of entomopathogenic fungi was surveyed in soil samples collected in the vicinity of horse chestnut trees heavily infested by *C. ohridella*. Native entomopathogenic strains were obtained from the samples by a live-bait method using the great wax moth, *Galleria mellonella* L., larvae (Zimmermann, 1986, Fig. 4).



FIGURE 4: *G. mellonella* larvae moving through soil sample.

Results

Damage level

The percentage of leaf area damaged by *C. ohridella* larvae varied between 5.9 in České Budějovice and 62.5 in Vsetín.

Parasitoids

The results showed that the rate of parasitism varied between 5% and 15% in most cases. The most parasitized stages of *C. ohridella* were spinning stages and especially pupae. The most abundant parasitoid species were *Minotetrastichus frontalis* (Fig. 5) and *Pnigalio* sp. (Hymenoptera, Eulophidae) in the western localities.



FIGURE 5: Adult of *Minotetrastichus frontalis*.

Pediobius saulius (Hymenoptera, Eulophidae) was abundant parasitoid species at the eastern localities. All species are polyphagous.

Entomopathogenic fungi

We isolated 72 strains of entomopathogenic fungi (Deuteromycota: Hyphomycetes). Dominant species found were *Paecilomyces fumosoroseus* (Wize) Brown et Smith, *Paecilomyces farinosus* (Holm ex S.F. Gray) Brown et Smith and *Beauveria bassiana* (Balsamo) Vuillemin (Figs. 6 and 7).



FIGURE 6: Soil samples with *G. mellonella* larvae after incubation for two months.



FIGURE 7: Developed mycosis on *G. mellonella* larvae: *Paecilomyces farinosus* (left), *Paecilomyces fumosoroseus* (middle) and *Beauveria bassiana* (right).

Conclusions

- Several species of parasitoids attack *C. ohridella* in the Czech Republic but the rate of parasitism is relatively low and does not prevent the pest outbreaks.
- Entomopathogenic fungi frequently occur in soil from *C. ohridella* habitats. If they prove to be effective in infecting *C. ohridella* pupae while being harmless to its parasitoids, they could become a new means for environmentally safe and sustainable control of *C. ohridella*.

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