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# Hawthorn psyllid fauna in northwestern Italy

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## Abstract

Hawthorn is one of the natural hosts of *Cacopsylla melanoneura* (Förster), the main vector of '*Candidatus* Phytoplasma mali', the causal agent of apple proliferation (AP) disease, a serious and growing problem for apple production in Europe, particularly in northern Italy.

Other psyllid species are acknowledged as hawthorn feeders, but no data are available on their presence and abundance in northwestern Italy. Samplings with yellow sticky traps and beat trays were carried out in two sites located in the Aosta Valley, containing wild *Crataegus monogyna* Jacquin plants and surrounded by meadows, wastelands, and vineyards, in the neighbourhood of apple orchards. *C. melanoneura* was the predominant species followed by *C. peregrina* (Förster) and *C. affinis* (Löw), while *C. crataegi* (Schrank) was sampled sporadically. Other six species are only occasional migrants.

The population dynamics of the two most abundant species, *C. melanoneura* and *C. peregrina* were investigated.

**Key words:** *Crataegus monogyna*, *Cacopsylla melanoneura*, *Cacopsylla affinis*, *Cacopsylla. peregrina*, *Cacopsylla crataegi*.

## Introduction

Hawthorn has always been considered as the primary host of *Cacopsylla melanoneura* (Förster), the main vector of '*Candidatus* Phytoplasma mali', the causal agent of the Apple proliferation (AP) disease in northwestern Italy (Conci *et al.*, 1993; Lauterer, 1999; Tedeschi *et al*., 2002; Tedeschi and Alma, 2004). The diffusion of the plant in the neighborhood of apple orchards induced us to investigate the hawthorn psyllid fauna to understand better the relationships between those insects and hawthorn plants and the possible implications in spreading the disease.

## Materials and methods

The research was carried out from 2003 until 2005. Two sites with wild plants of *Crataegus monogyna* Jacquin surrounded by meadows, wastelands, vineyards, in the neighborhood of apple orchards were chosen in the Aosta Valley (northwestern Italy), at an altitude between 480 and 580 m a.s.l. Yellow sticky traps were firstly used to identify and quantify the psyllid fauna, and then, in addition with beat trays, to study the population dynamics of the most abundant species. In each site 3 traps (150x80 mm Rebell®giallo, Andermatt Biocontrol AG, Switzerland) were hung in the hawthorn canopy from mid February to end October. The traps were changed weekly. Beat tray samplings were carried out only in 2004 and 2005, weekly, during the same period. To identify psyllids, samples were classified examining male and female terminalia (Ossiannilsson, 1992).

**Table 1.** Psyllid species caught on hawthorn plants by means of yellow sticky traps in 2003. Total number of adults collected.

| Species | No | Proportion (%) |
|---|---|---|
| *C. melanoneura*-*C. affinis* complex | 3669 | 70.24 |
| *Cacopsylla peregrina* (Förster) | 1526 | 29.22 |
| *Cacopsylla crataegi* (Schrank) | 20 | 0.38 |
| *Cacopsylla pulchella* (Löw) | 2 | 0.04 |
| *Cacopsylla pruni* (Scopoli) | 2 | 0.04 |
| *Cacopsylla pyrisuga* (Förster) | 1 | 0.02 |
| *Baeopelma foersteri* (Flor) | 1 | 0.02 |
| *Psyllopsis fraxini* (L.) | 1 | 0.02 |
| *Trioza rhamni* (Schrank) | 1 | 0.02 |

## Results

During the preliminary trap samplings, ten species of psyllids were identified (table 1).

*C. melanoneura* was the predominant species, followed by *Cacopsylla peregrina* (Förster), while *Cacopsylla crataegi* (Schrank), was sampled sporadically. Other 6 psyllid species on the table beginning with *Cacopsylla pulchella* (Löw) are only occasional migrants living on other trees. In-depth examinations of the apical part of the aedeagus, of the shape of the paramer as well as of the forewing on 3,700 specimens of *C. melanoneura*, revealed that, on hawthorn, the *C. melanoneura* populations in the Aosta Valley is mixed with the congeneric *Cacopsylla affinis* (Löw). The resemblance to *C. melanoneura* is so close that the females of the two species cannot be reliably distinguished. For reliable data, the proportion of the two species was assessed only with the males among the 3,700 specimens analyzed. *C. affinis* makes up to 21.6% of the overwintered population and 6.9% of newly emerged adults of both species. Subsequently the samplings were focused on the most abundant species, *C. melanoneura*-*C. affinis* complex and *C. peregrina*. The population dynamics of *C. melanoneura* on *C. monogyna* is similar to that observed on apple trees

(Tedeschi *et al*., 2002) and the presence period is almost the same on the two hosts. Overwintered adults arrive in mid February, while newly emerged adults move to alternative hosts at the beginning of June.

*C. peregrina* overwinters as eggs on hawthorn plants, nymphs were observed in the second half of April, while adults emerged at the end of April, reaching a peak in the second half of May, then the population rapidly decreased because of migration to occasional plants as observed by Lauterer (1999). A second peak was observed in mid October, but *C. peregrina* was still collected by traps until mid November.

In our regions the presence of *C. crataegi*, already known as a typical hawthorn feeder, is irrelevant, thus not worrying.

On the contrary attention should draw to *C. peregrina* and in particular to *C. melanoneura*, because of the high density and the vicinity to apple orchards. From this point of view, *C. monogyna* can be considered as a dangerous source for the AP phytoplasma vector, but further analyses are required to confirm this assumption.

## Discussion

The present work points out the leading role of *C. melanoneura* in the hawthorn psyllid fauna, but the difficulties in discriminating females of the *C. melanoneura*-*C. affinis* complex influenced the research.

Studies to develop molecular tools to separate the two species *C. melanoneura* and *C. affinis* are in progress hoping to find an easy and reliable way of discrimination, compatible also with phytoplasma detection. Molecular analyses to detect the presence of phytoplasmas in the hawthorn psyllid fauna and, if necessary, transmission trials will better define the real risk of *C. monogyna* as a possible source of phytoplasma vectors.

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