

IOBC / wprs

Working Group “Integrated Protection of Fruit Crops”

**Proceedings of the Joint Meeting of the sub-Groups
“Pome fruit arthropods” and “Stone fruits”**

**Workshop on
“Sustainable protection of fruit crops
in the Mediterranean area”**

at

Vico del Gargano (Italy)

12 - 17 September, 2010

Edited by

A. De Cristofaro, A. Di Palma, L. A. Escudero-Colomar, C. Ioriatti, F. Molinari

**IOBC wprs Bulletin
Bulletin OILB srop**

Vol. 74, 2012

The content of the contributions is in the responsibility of the authors.

The IOBC/wprs Bulletin is published by the International Organization for Biological and Integrated Control of Noxious Animals and Plants, West Palearctic Regional Section (IOBC/wprs).

Le Bulletin OILB/srop est publié par l'Organisation Internationale de Lutte Biologique et Intégrée contre les Animaux et les Plantes Nuisibles, section Regionale Ouest Paléarctique (OILB/srop).

Copyright: IOBC/wprs 2012

The Publication Commission of the IOBC/wprs:

Dr. Ute Koch
Schillerstrasse 13
D-69509 Moerlenbach (Germany)
Tel +49-6209-1079, Fax +49-6209-4849
e-mail: u.koch_moerlenbach@t-online.de

Dr. Annette Herz
Julius Kühn-Institute (JKI)
Federal Research Center for Cultivated Plants
Institute for Biological Control
Heinrichstr. 243
D-64287 Darmstadt (Germany)
Tel +49 6151 407-236, Fax +49 6151 407-290
e-mail: Annette.Herz@jki.bund.de

Address General Secretariat:

Dr. Philippe C. Nicot
INRA – Unité de Pathologie Végétale
Domaine St Maurice - B.P. 94
F-84143 Montfavet Cedex (France)

ISBN 978-92-9067-251-7

<http://www.iobc-wprs.org>

Darmstadt (Germany), 2012

Lacewings (Neuroptera) as beneficial insects in orchards: findings for plum and cherry trees in Lombardy (northern Italy)

Rinaldo Nicoli Aldini

Istituto di Entomologia e Patologia vegetale, Facoltà di Agraria, Università Cattolica del Sacro Cuore, Via Emilia Parmense 84, I-29100 Piacenza (Italy).

E-mail: rinaldo.nicoli@unicatt.it

Abstract: During faunal investigation of Neuropterida in two areas of Lombardy (northern Italy), i.e. Lomellina (province of Pavia) and Val Camonica (province of Brescia), the author also conducted field research in mixed-fruit family orchards (one orchard in each area) in which plum and cherry trees are present. More than twenty identified species of Neuroptera (Chrysopidae, Hemerobiidae, Coniopterygidae) were collected in all on these drupaceous trees. The mountain orchard in Val Camonica was found to be clearly richer in species than the lowland orchard in Lomellina. The different eco-climatic, and especially the vegetational features of the two areas explain the differences in number of species in lacewing populations of the two different orchards.

Key words: Chrysopidae, Hemerobiidae, Coniopterygidae, *Prunus* spp., predators

Introduction

Lacewings (Neuropterida: Neuroptera (*s. str.*) or Planipennia) are mainly predatory insects. Their families Chrysopidae, Hemerobiidae and Coniopterygidae are also found in crops, where in the larval stage or even as adults they play a useful role as natural control agents of small plant pests (Homoptera: Sternorrhyncha, tetranychid mites, etc.) (Canard 2001). Field research on their presence on fruit trees is therefore of a certain interest from an applied point of view (McEwen *et al.* 2001; Szentkirályi 2001).

As of the late 1970s, the author has conducted faunal research into Neuropterida in two districts of Lombardy: Lomellina and Val Camonica. As far as Val Camonica is concerned, summaries of the overall results of the research have already been published (Nicoli Aldini 1994, 2005); as regards Lomellina, on the contrary, only very few data have been published up to now (Nicoli Aldini 1983). During these investigations, some samplings were also carried out in mixed-fruit family orchards, obtaining data on the presence of these beneficial insects on the plum (*Prunus domestica*) and cherry tree (*P. avium*, *P. cerasus*). The aim of this note is to summarize and compare the findings for these drupaceous trees in two mixed-fruit family orchards sited in the two different districts considered.

Material and methods

Investigated areas and orchards

The Lomellina area, part of the province of Pavia, is the western plain area of Lombardy, north of the Po and west of the Ticino rivers. In this area, the family orchard considered (orchard *a*, not chemically treated; grassy soil; fruit trees: plum, cherry, apple, quince, persimmon, walnut, hazel), located at Pieve Albignola, 85m above the sea level, covered a

plot close to the built-up area; in the first decade of research it was also used to some extent for growing vegetables, but it was then semi-abandoned with subsequent loss of some fruit trees and invasion by infesting plants (false acacia, red weed, tree of heaven, bramble, etc.); a warm-humid climate characterizes the summer months.

The Val Camonica, in the province of Brescia, is a Pre-Alpine and Alpine valley of the central Alps, located in the far north-eastern part of Lombardy. In this area, the family orchard considered (orchard *b*, not chemically treated; grassy soil; fruit trees: apple, pear, plum, cherry, peach, persimmon, hazel, more recently also kiwi), located at Sellero, 460-470m above the sea level, on the lower slopes of the central Val Camonica, covers a plot on a terraced slope close to the built-up area; the slope is also partially used as a garden and vegetable garden; this orchard lies near a stream which flows through the village, and is partly bordered by some willow trees and a hedge of elder and false acacia; the orchard is exposed to the sun but relatively cool and sheltered from the wind.

Collecting methods, sampling periods, specimens examined

Collection was carried out using only an entomological net, by beating and shaking the leafy branches of the trees, up to a height of approx. 4m from the ground. The present work considers only the adults collected from plum (*Prunus domestica*) and cherry trees (*P. avium*, *P. cerasus*). The years of collecting in the two orchards were as follows: Pieve Albignola, 1985-1990, 1998, 2010 (31 adult specimens were collected in all, on approx. 10 different occasions); Sellero, 1977-78, 1985-87, 1989-90, 1993, 1999, 2002, 2009-10 (72 adult specimens were collected in all, on approx. 40 different occasions). Thus the samplings in the two orchards were made over about thirty years, although very discontinuously as regards the years of research. Samplings were made mainly during the summer months. Due to the discontinuity of the investigation over a very long time and the relatively low number of collected specimens, the results are principally of qualitative value, not providing sure indications on the real abundance of each species on plum and cherry trees. Nevertheless, in Table 1 the total numbers of the collected specimens in each orchard and the year/years of collecting are reported, in order to provide available biocoenotic data.

Specimen identification

The specimens, preserved partly in alcohol, partly dried-pinned in the author's collection, were identified following Aspöck *et al.* (1980, 2001) as the basic literature for systematic listing and nomenclature. As regards the sibling species of the *Chrysoperla carnea* complex recognized in recent years (see e.g. Henry *et al.* 2001; Canard & Thierry 2007), because of the difficulty of identifying the different species on the basis of preserved specimens, these are here indicated collectively under the name '*Chrysoperla carnea* (Stephens, 1836) complex'. As regards coniopterygids, the females of the genera *Coniopteryx* and *Semidalis* were not identified up to species level due to the well-known difficulties in achieving a sure specific discrimination.

Results and discussion

Notes on the collected taxa

The full results are summarized in Table 1. More than twenty identified species were collected in all. The Chrysopidae was the most commonly found family in both orchards. As it can be inferred from Table 1, the obtained data refer mainly to the plum tree; as regards the cherry tree, the low number of findings is due not only to the presence, in both orchards, of

only very few trees, but also to the medium or large size of the trees themselves; the sampling method, using a net, only accessed the lower leafy branches.

Table 1. Adult lacewings collected on plum and/or cherry trees in the two mixed-fruit family orchards investigated (**spcm. n.** = number of specimens; p = plum; c = cherry).

Family, species	Lomellina (Pavia): Pieve Alb.		Val Camonica (Brescia): Sellero	
	spcm. n.	year/years	spcm. n.	year/years
Chrysopidae				
<i>Nineta flava</i> (Scopoli, 1763)			3 (p)	1977, 1985
<i>Chrysotropia ciliata</i> (Wesmael, 1841)			5 (p)	1987, 1989
<i>Chrysopa formosa</i> Brauer, 1850	1 (p)	1985		
<i>Chrysopa pallens</i> (Rambur, 1838)	1 (p)	1985	2 (p,c)	1985-86
<i>Chrysopa perla</i> (L., 1758) sensu Schneider, 1851	1 (p)	1987	2 (p)	1985, 1993
<i>Chrysopa viridana</i> Schneider, 1845	1 (p)	1985		
<i>Dichochrysa flavifrons</i> (Brauer, 1850)			3 (p)	1985, 2002
<i>Dichochrysa inornata</i> (Navás, 1901)	9 (p)	1985-89		
<i>Dichochrysa prasina</i> (Burmeister, 1839)			1 (p)	1985
<i>Cunctochrysa albolineata</i> (Killington, 1935)			3 (p)	1985
<i>Chrysoperla carnea</i> (Stephens, 1836) complex	4 (p)	1987, 1990, 1998, 2010	9 (p,c)	1985-87
Hemerobiidae				
<i>Hemerobius (Hemerobius)</i> <i>gilvus</i> Stein, 1863			1 (p)	1985
<i>Hemerobius (Hemerobius)</i> <i>humulinus</i> Linnaeus, 1758	3 (p)	1989-90	7 (p)	1977-78, 1986, 1989
<i>Hemerobius (Hemerobius)</i> <i>lutescens</i> Fabricius, 1793			1 (p)	1978
<i>Hemerobius (Hemerobius)</i> <i>micans</i> Olivier, 1792			1 (p)	1978

Family, species	Lomellina (Pavia): Pieve Alb.		Val Camonica (Brescia): Sellero	
	spcm. n.	year/years	spcm. n.	year/years
<i>Hemerobius (Hemerobius) pini</i> Stephens, 1836			1 (p)	1990
<i>Wesmaelius (Kimminsia) subnebulosus</i> (Stephens, 1836)			2 (p)	1985
<i>Drepanopteryx phalaenoides</i> (Linnaeus, 1758)			1 (c)	1985
Coniopterygidae				
<i>Coniopteryx (Coniopteryx) tineiformis</i> Curtis, 1834 (♂♂)			2 (p,c)	1985
<i>Coniopteryx (Metaconiopteryx) esbenpeterseni</i> Tjeder, 1930 (♂♂)	2 (p,c)	1985	2 (p)	1985
<i>Coniopteryx (Metaconiopteryx) lentiae</i> Asp. & Asp., 1964 (♂♂)			6 (p)	1985, 2010
<i>Coniopteryx</i> sp./spp. (♀♀)	9 (p,c)	1985, 1990	12 (p,c)	1985-86, 2010
<i>Semidalis aleyrodiformis</i> (Stephens, 1836) (♂♂)			3 (p)	1985, 2009, 2010
<i>Semidalis</i> sp./spp. (♀♀) (? <i>aleyrodiformis</i> (Stephens, 1836))			5 (p)	1985, 1999, 2010

Five genera were present on *Prunus* in both orchards: *Chrysopa*, *Dichochrysa*, *Chrysoperla*, *Hemerobius*, *Coniopteryx*; the other genera (*Nineta*, *Chrysotropia*, *Cunctochrysa*, *Wesmaelius*, *Drepanopteryx*, *Semidalis*) were present only in orchard *b* (Val Camonica), where the number of species was also decidedly higher and the hemerobiids particularly were better represented. Of these, the single specimen of *Hemerobius pini* Stephens, a species living exclusively on coniferous trees, is clearly casual and due to the relative proximity of some spruce (*Picea abies*) trees. The finding in orchard *a* (Lomellina) of *Dichochrysa inornata* Navás, a very sporadic species, found in Italy almost exclusively in the southern regions (see e.g. Pantaleoni & Letardi 1998) and previously never quoted for Lombardy, is noteworthy from a faunal point of view.

As reported above, the present work deals exclusively with adult specimens found also, or only, on drupaceous trees, omitting the species found exclusively on different fruit trees, other trees, shrubs and grass in each orchard (otherwise the list of genera and species would

be richer). Not necessarily, however, the species listed here are all present and active in the larval stage on stone fruit trees; on the other hand the adults of certain species (*C. perla*, *C. formosa*) live habitually on grass and shrubs and only occasionally are found on the foliage of trees.

Further comments

The overall picture of lacewing coenoses on drupaceous trees in these orchards and the differences between the two orchards are obviously influenced by the whole eco-climatic and, particularly, vegetational characteristics of the two geographic areas and sites; these ecological features underlie the different numbers of genera and species of the lacewing populations in the two different areas of Lombardy. In this respect, the mountain area of Val Camonica is clearly richer than the plain area of Lomellina.

As regards the stone fruit trees, no comprehensive data were previously available in the literature on lacewings found on the plum and cherry in Italy, while observations on the lacewings in peach orchards have been available for some time (Castellari 1980; Pantaleoni & Tisselli 1986; Pantaleoni & Ticchiati 1988; Pantaleoni 2001; Letardi *et al.* 2002), more recently also for apricot orchards (Baldacchino 2006). Instead, some research on lacewings (at least as far as chrysopids and hemerobiids are concerned) in plum and cherry orchards has been published for other European countries. For comparisons with other European and non-European data, it might be useful to refer to the relatively recent review by Szentkirályi (2001).

The present research in Lombardy undoubtedly shows a large number of species occurring on the plum tree; this is probably due to various circumstances, such as the long time span of the investigation, the general environmental context of the orchards (especially the mountain orchard in Val Camonica, as outlined above), the fact that the stone fruit trees are mixed with other fruit trees, the soil covered with grass, and the absence of chemical treatment.

Acknowledgements

Grateful thanks to Dr. Agostino Letardi, ENEA C.R. CASACCIA, Santa Maria di Galeria, Rome, and Prof. Roberto A. Pantaleoni, Dipartimento di Protezione delle Piante, Sezione di Entomologia agraria, Università degli Studi, Sassari, & Istituto per lo Studio degli Ecosistemi – CNR, Li Punti (Sassari), for some bibliographic suggestions.

References

- Aspöck, H., Aspöck, U. & Hölzel, H. (unter Mitarbeit von Rausch, H.) 1980: Die Neuropteren Europas. Eine zusammenfassende Darstellung der Systematik, Ökologie und Chorologie der Neuropteroidea (Megaloptera, Raphidioptera, Planipennia) Europas. Goecke & Evers, Krefeld, vol. I: 495 pp.; vol. II: 355 pp.
- Aspöck, H., Hölzel, H. & Aspöck, U. 2001: Kommentierter Katalog der Neuropterida (Insecta: Raphidioptera, Megaloptera, Neuroptera) der Westpaläarktis. *Denisia* 02: 606 pp.
- Baldacchino, F. 2006: L'impegno dell'ENEA per la frutticoltura biologica del Metapontino. *Notiziario sulla Protezione delle Piante*, N.S. 18 (2004): 249-254.

- Canard, M. 2001: Natural food and feeding habits of lacewings. In: Lacewings in the crop environment, eds. McEwen, New and Whittington, University Press, Cambridge: 116-129.
- Canard, M. & Thierry, D. 2007: A historical perspective on nomenclature within the genus *Chrysoperla* Steinmann, 1964 in Europe: the *carnea*-complex (Neuroptera Chrysopidae). Proceedings of the Ninth International Symposium on Neuropterology, Ferrara 20-23 June 2005 [with a tribute to Maria Matilde Principi], eds. Pantaleoni, Letardi and Corazza, Annali del Museo civico di Storia naturale di Ferrara 8 (2005): 173-179.
- Castellari, P. L. 1980: Indagini biologiche su *Coniopteryx (Metaconiopteryx) esbenpeterseni* Tjeder (Neur. Coniopterygidae), predatore di Acari Tetranychidi sul Pesco. Bollettino dell'Istituto di Entomologia dell'Università di Bologna 35: 157-180.
- Henry, C. S., Brooks, S. J., Thierry, D., Duelli, P. & Johnson, J. B. 2001: The common green lacewing (*Chrysoperla carnea* s. lat.) and the sibling species problem. In: Lacewings in the crop environment, eds. McEwen, New and Whittington, University Press, Cambridge: 29-42.
- Letardi, A., Tabilio, M. R., Visani, N. & Fulvo, A. 2002: Diversità del popolamento di artropodi predatori in tre differenti biotopi di un agroecosistema della campagna romana. Informatore fitopatologico 52(10): 66-68.
- McEwen, P., New, T. R. & Whittington, A. E. (eds.) 2001: Lacewings in the crop environment. Cambridge University Press, Cambridge: 546 pp.
- Nicoli Aldini, R. 1983: Note sulla geonemia di alcuni Neurotteri Planipenni italiani. Giornale italiano di Entomologia 1(3): 123-127.
- Nicoli Aldini, R. 1994: Ricerche faunistiche sui Neurotteri Planipenni di Val Camonica (Alpi e Prealpi Lombarde). Atti XVII Congresso nazionale italiano di Entomologia, Udine 13-18.VI.1994: 211-216.
- Nicoli Aldini, R. 2005: I Neurotteri (Insecta Neuropterida) della Val Camonica e del Parco Naturale dell'Adamello (Alpi e Prealpi Lombarde): materiali per un'analisi zoogeografica del popolamento. Biogeographia 26: 417-430.
- Pantaleoni, R. A. 2001: Lacewing occurrence in the agricultural landscape of Pianura Padana. In: Lacewings in the crop environment, eds. McEwen, New and Whittington, Cambridge University Press, Cambridge: 447-470.
- Pantaleoni, R. A. & Letardi, A. 1998: I Neuropterida della collezione dell'Istituto di Entomologia "Guido Grandi" di Bologna. Bollettino dell'Istituto di Entomologia "Guido Grandi" dell'Università di Bologna 52: 15-45.
- Pantaleoni, R. A. & Ticchiati, V. 1988: I Neurotteri delle colture agrarie: osservazioni sulle fluttuazioni stagionali di popolazione in frutteti. Bollettino dell'Istituto di Entomologia "Guido Grandi" dell'Università di Bologna 43: 43-57.
- Pantaleoni, R. A. & Tisselli, V. 1986: I Neurotteri delle colture agrarie: rilievi sui Crisopidi in alcune coltivazioni del Forlivese. Bollettino dell'Istituto di Entomologia "Guido Grandi" dell'Università di Bologna 40: 51-65.
- Szentkirályi, F. 2001: Lacewings in fruit and nut crops. In: Lacewings in the crop environment, eds. McEwen, New and Whittington, Cambridge University Press, Cambridge: 172-238.