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Conifer aphids (Homoptera: Aphididae) and some natural enemies in the León province (Spain)

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ABSTRACT

A study carried out between 1988 and 1991 in the Province of León (Spain), recorded thirteen species of conifer aphids belonging to the genera *Cinara*, *Eulachnus* and *Schizolachnus*, and several of their natural enemies belonging to Aphidiinae (Hym., Braconidae) of the genera *Pauesia* and *Praon*, Coccinellidae (Col.) of the genera *Adalia, Anatis, Chilocorus, Coccinella, Exochomus* and *Myrrha*, Syrphidae (Dip.) of the genera *Sphaerophoria*, and Chrysopidae (Neu.) of the genera *Chrysoperla*.

Key words: Forest pest, natural control.

RESUMEN

Pulgones de coníferas y algunos enemigos naturales en la provincia de León (España) (Homoptera: Aphididae).

A partir de un estudio realizado entre 1988-1991 en la provincia de León (España), se presentan 13 especies de pulgones de coníferas pertenecientes a los géneros *Cinara, Eulachnus* y *Schizolachnus*, y los enemigos naturales pertenecientes a la subfamilia Aphidiinae (Hym., Braconidae) de los géneros *Pauesia* y *Praon;* Coccinellidae (Col.) de los géneros *Adalia, Anatis, Chilocorus, Coccinella, Exochomus* y *Myrrha*; Syrphidae (Dip.) del género *Sphaerophoria*, y Chrysopidae (Neu.) del género *Chrysoperla*.

Palabras clave: Plagas forestales, lucha biológica.

INTRODUCTION

Knowledge of the conifer aphid fauna in Spain has considerably increased over the last ten years, due mainly to the contributions of Binazzi *et al.* (1983), Notario *et al.* (1984), Gutiérrez *et al.* (1985), Mier Durante & Nieto Nafría (1987), Notario *et al.* (1992) and Núñez-Pérez (1992). We now have many reports of significant damage to the new plantings and to established plantations (Notario & Baragaño, 1990). Aphid attacks on conifers are now considered to be important.

The natural enemies of these conifer-infesting aphid species are not well known in Spain and are known only because of isolated data in sporadic samplings mainly by NOTARIO & BARAGAÑO (1990), MICHELENA & GONZÁLEZ-FUNES (1988) and TIZADO & NÚÑEZ-PÉREZ (1991). The objective of this report is to record natural enemies found in our four year survey.

MATERIAL AND METHODS

The field work carried out between the years 1988 and 1991 in the Province of León (Spain), directly sampled plantations of pines and other ornamental conifers in parks and gardens. The species of conifers which harboured colonies of aphids, belong to the taxa: *Cedrus atlantica* (Endl.) Carrière [C.a.], *Picea abies* (L.) Karsten [P.a.], *Pinus nigra* Arnold ssp. *laricio* (Poiret) Maire [P.n.l.], *P. nigra* Arnold ssp. *salzmannii* (Dunal) Franco [P.n.s.], *P. pinaster* Aiton [P.p.], *P. pinaster* Aiton ssp. *atlantica* H. del Villar [P.p.a.], *P. radiata* D. Don [P.r.], *P. sylvestris* L. [P.s.], *P. uncinata* Miller ex Mirbel [P.u.] and *Thuja orientalis* L. [T.o.]. The host tree species abbreviations indicated here are used below to indicate trees where natural enemies were collected.

Five parasitoid species of Aphidiinae (Hym., Braconidae) and eight predator species of Coccinellidae 6 (Col.), Syrphidae 1 (Dip.) and Chrysopidae 1 (Neu.) were identified. Collecting locations and dates are also included.

RESULTS

The natural enemy species are grouped according to host aphid species. Host plants are indicated using the abbreviations given above.

Cinara brauni Börner, 1940

This species is reported for the first time from Spain on *Pinus nigra* ssp. *salzmannii* (Riofrío, 7-VII-90). It has been recorded from Central and Eastern Europe (Germany, Austria, Bulgaria, what was Czechoslovakia, Holland, Hungary, Poland, Switzerland and what was Jugoslavia), although it is also known in England, Italy, Crimea and Turkey from *Pinus* spp., with the preferred host being *P. nigra*.

It is a polymorphic species with regard to extension and general aspect of the sclerotization of the abdominal tergites V-VII throughout the year. The tergites usually appear to be less sclerotized in winter through to the beginning of spring and in the middle of summer (BINAZZI & ROVERSI, 1987). The aphid usually lives on young shoots and one year old branches, forming dense colonies which usually produce abundant honeydew and are frequented by ants –*Camponotus piceus* (Leach, 1825) and *Lasius niger* (L., 1758) in the Province of León–.

Natural enemies:

Hym.: *Pauesia picta* (Haliday, 1834): *P.n.s.* (Riofrío, 7-VII-90).
Col.: *Exochomus quadripustulatus* (L., 1758): *P.n.s.* (Riofrío, 7-VII-90).
Dip.: *Sphaerophoria scripta* (L., 1758): *P.n.s.* (Riofrío, 7-VII-90).

Cinara cedri Mimeur, 1936

This species is known from Europe (UK, France, Italy and Spain), Africa (Morocco), Asia (Iran and Turkey) and Argentina. It develops on *Cedrus* sp., on which it forms colonies which may be dense on the bark of young plants or on branches of 1-5 cm in diameter on mature plants, producing a great deal of honeydew. It presently spreading in Europe because of the increasing introduction of its host plant as an ornamental plant. In Spain, the species has been collected from *C. atlantica* (Valencia de Don Juan, 5-X-90 and León, 9-VI-91), *C. libani* A. Richard and *C. deodorata* (D. Don) G. Don (Nieto Nafría *et al.*, 1984). The trees attacked by this species are sometimes defoliated, do not produce cones and their growth is considerably reduced.

Natural enemies:

Col.: *Adalia bipunctata* (L., 1758): *C.a.* (León, 9-VI-91).

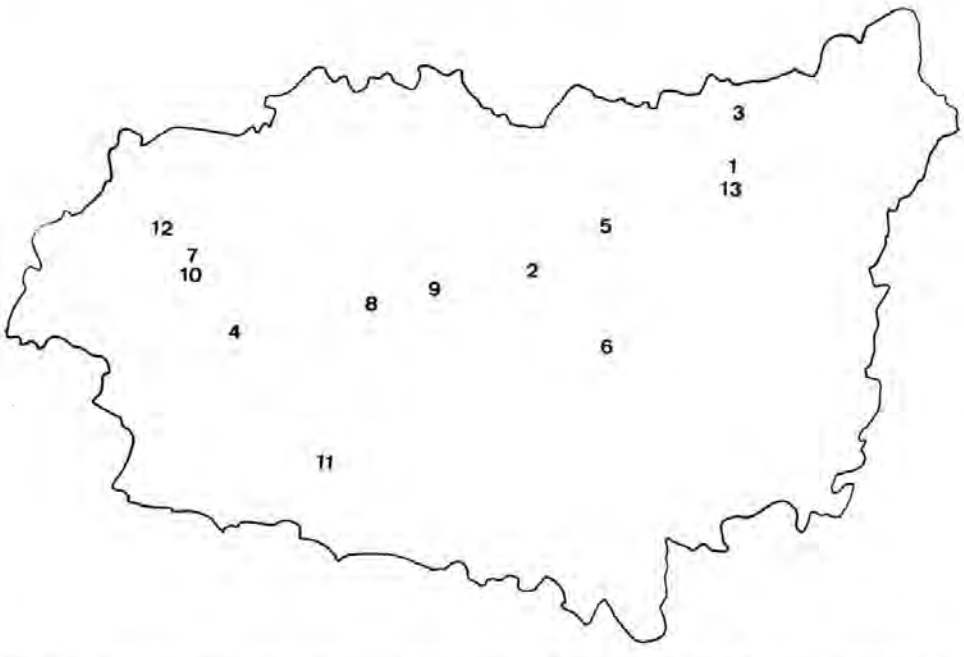
Cinara costata (Zetterstedt, 1828)

This species has been reported sporadically throughout Europe, North America, Japan and Australia, living on *Picea abies* and *P. omorika* (Pancic) Purkyne in Europe. However, in Spain it is known from the winged specimens captured in traps (Seco, 1990) and from only one apterous sample from *P. abies* (Tizado, 1991). We frequently found this species on *P. abies* (Valencia de Don Juan, 19-VII-90; León, 23-VII-91; Ponferrada, 12-VI-91) in parks and gardens of the Province of León.

It usually lives on the oldest branches or on the trunk when the tree is young and normally forms dense floury looking colonies on branches because of its wax covering. This species also produces abundant honeydew. No natural enemy was captured with this species.

Cinara maritimae (Dufour, 1833)

This species has a mainly Mediterranean distribution, although it has been reported from Madeira and South America (Argentina, Brazil and Chile). In León, it is widely distributed on various pine species: *P. nigra* ssp. *laricio* (Fresnedo, 7-VIII-90); *P. nigra* ssp. *salzmannii* (Campo Sagrado, 1-VII-90; León, 1-V-90; Riofrío, 7-VII-90); *P. pinaster* (Puerto de Manzanal, 7-VIII-90;



Mape 1: Localities samples in the province of León: 1. Adrados; 2. Campo Sagrado; 3. Cofiñal; 4. Fresnedo; 5. La Robla; 6. León; 7. Ocero; 8. Puerto de Manzanal; 9. Riofrío; 10. Sancedo; 11. Tabuyo del Monte; 12. Vega de Espinareda; and 13. Voznuevo.

Mapa 1: Localidades muestreadas en la provincia de León: 1. Adrados; 2. Campo Sagrado; 3. Cofiñal; 4. Fresnedo; 5. La Robla; 6. León; 7. Ocero; 8. Puerto de Manzanal; 9. Riofrío; 10. Sancedo; 11. Tabuyo del Monte; 12. Vega de Espinareda; y 13. Voznuevo.

Sancedo, 29-IX-90, 7-VIII-90; Tabuyo del Monte, 7-VIII-90; Vega de Espinareda, 29-IX-90; Voznuevo, 7-VI-90) and *P. radiata* (Sancedo, 29-IX-90). It lives in isolation or forms small colonies on branches of one year or more and it is frequented by ants.

Natural enemies:

Hym.: *Pauesia jezoensis* (Watanabe, 1941)*: P.p. (*Puerto de Manzanal, 7-VIII-90; Tabuyo del Monte, 7-VIII-90); *Pauesia picta* (Hal., 1834)*: P.n.s. (*Riofrío, 7-VII-90); *Pauesia pini* (Haliday, 1834): *P.n.s.* (Campo Sagrado, 1-VII-90); *P.p.* (Sancedo, 29-IX-90; Tabuyo del Monte, 7-VIII-90)

Col.: *Adalia bipunctata* (L., 1758)*: P.p.* (Puerto de Manzanal, 7-VIII-90); *Chilocorus bipustulatus* (L., 1758)*: P.n.s.* (León, 1-V-90); *Coccinella septempunctata* (L., 1758)*: P.p.* (Puerto de Manzanal, 7-VIII-90); *Myrrha (Metamyrrha) octodecimguttata* (L., 1758): *P.n.s.* (Campo Sagrado, 1-VII-90).

Neu.: *Chrysoperla carnea* (Stephens, 1836)*: P.p.* (Puerto de Manzanal, 7-VIII-90).

	P.n.l.	P.n.s.	P.p.	P.p.a.	P.r.	P.s.	P.u.	C.a.	P.a.	T.o.	N
C. brauni		•									1
C. cedri								•			2
C. costata									•		1
C. maritimae	•	•	●		•	•					12
C. pilicornis									•		2
C. pinea		•				●	•				9
C. pini						•					3
C. tujafilina										•	2
E. brevipilosus						•					1
E. mediterraneus		•	•								4
E. rileyi		•		•		•					5
E. tuberculostemmatus			•								1
S. pineti		•		•		•					3
N	1	12	9	2	1	13	1	2	3	2	46

Table 1: Number of localities (dot sizes indicate 1-6 localities) where the conifer aphids were captured in León. (Abbreviations of names of plant species as in the Material and Methods.) N = total number of samples.

Tabla 1: Número de localidades (el tamaño de los puntos indican de 1 a 6 localidades) donde se han capturado los pulgones de coníferas en León. (Las abreviaturas de los nombres de las especies de plantas se dan en Material y Metodos.) N = número total de muestras.

Cinara pilicornis (Hartig, 1841)

This species has a wide distribution and is known from Europe, Asia, North America and introduced to Australia and New Zealand. It lives on species of the genus *Picea*, especially *P. abies* and *P. omorika* in Europe, where it colonizes young shoots, producing an abundant honeydew. In this study it was captured on *P. abies* (Cembranos, 26-VI-88; Villarrodrigo de las Regueras, 22-V-90), normally found in parks and gardens. No natural enemy was captured with this species.

Cinara pinea (Mordvilko, 1895)

Throughout Europe, Georgia, Eastern Siberia and introduced to North America. This holartic species usually lives on shoots or one year old branches

and can produce abundant honeydew. It is widely distributed throughout the study area, living on three pine species: *P. sylvestris* (Campo Sagrado, 1-VII-90; Cofiñal, 7-VI-90; La Robla, 16-VI-90; Ocero, 7-VIII-90; Voznuevo, 7-VI-90); *Pinus nigra* ssp. *salzmannii* (Campo Sagrado, 1-VII-90; La Robla, 20-IX-90; León, 1-V-90) in mixed stands with *P. sylvestris*, and *P. uncinata* (Adrados, 7-VI-90). It is visited by ants.

Natural enemies:

Hym.: *Pauesia picta* (Hal., 1834): *P.s.* (Campo Sagrado, 1-VII-90); *Pauesia. pini* (Hal., 1834): *P.n.s.* (Campo Sagrado, 1-VII-90); *P.s.* (Campo Sagrado, 1-VII-90).

Col.: *Anatis ocellata* (L., 1758): *P.s.* (Cofiñal, 7-VI-90); *Chilocorus bipustulatus* (L., 1758): *P.n.s.* (León, 1-V-90); *Myrrha (Metamyrrha) octodecimguttata* (L., 1758): *P.n.s.* (Campo Sagrado, 1-VII-90; La Robla, 20-IX-90).

Cinara pini (L., 1758)

This species is distributed throughout Europe, Turkey and North America and apparently also in Japan. In Europe it lives on *Pinus sylvestris* (Campo Sagrado, 1-VII-90; La Robla, 20-IX-90; Ocero, 7-VIII-90) and in accordance with BINAZZI (1978) also *P. mugo* Turra, colonizing branches of one or more years of age and is frequented by ants.

Natural enemies:

Neu.: *Chrysoperla carnea* (Stephens, 1836): *P.s.* (Puerto de Manzanal, 7-VIII-90).

Cinara tujafilina (Del Guercio, 1909)

A virtually cosmopolitan species, including many warmer regions, which develops on *Thuja orientalis* (León, 2-VII-90; Valencia de Don Juan, 24-IX-89) and other Cupressaceae, where it lives on the bark of the branches and on twigs or below the small apical cones, forming dense colonies and producing a large amount of honeydew.

Natural enemies:

Col.: *Adalia bipunctata* (L., 1758): *T.o.* (León, 2-VII-90).

Eulachnus brevipilosus Börner, 1940

This is an aphid of Euroatlantic distribution has been introduced into the United States, British Columbia, Canada and New Zealand. It lives on *P. sylvestris* (Cofiñal, 7-VI-90) and sometimes on *P. mugo*, occupying the young branches. No natural enemy was captured with this species.

Eulachnus mediterraneus Binazzi, 1983

It is distributed throughout the west Mediterranean living on *Pinus* spp., mainly *P. pinaster* (Puerto de Manzanal, 7-VIII-90; Voznuevo, 7-VI-90) and also *P. nigra* ssp. *salzmannii* (La Robla, 20-IX-90; Riofrío, 7-VII-90).

Natural enemies:

Col.: *Coccinella septempunctata* (L., 1758): *P.p.* (Puerto de Manzanal, 7-VIII-90); *Myrrha (Metamyrrha) octodecimguttata* (L., 1758): *P.n.s.* (La Robla, 20-IX-90).

Eulachnus rileyi (Williams, 1910)

This species has an holarctic distribution and it is a very common aphid in Europe, Mediterranean area and Southwest Asia; introduced into Africa South of the Equator and North, South and Central America. It lives on various species of the genus *Pinus* (*P. nigra* ssp. *salzmannii,* La Robla, 20-IX-90, León, 1-V-90; *P. pinaster* ssp. *atlantica,* La Robla, 20-IX-90; and *P. sylvestris* (La Robla, 16-VI-90, 20-IX-90). This aphid is found on the needles and on one year and older branch bark. It is able to form very dense colonies which produce a large amount of honeydew when the population is abundant. This aphid can cause serious damage to its host plant, eading to a progressive weakness of the tree, premature needle drop and to extensive development of sooty mould fungi on the honeydew.

Natural enemies:

Hym.: *Praon bicolor* Mackauer, 1959: *P.p.a.* (La Robla, 20-IX-90); *P.s.* (La Robla, 16-VI-90).

Col.: *Chilocorus bipustulatus* (L., 1758): *P.n.s.* (León, 1-V-90); *Myrrha (Metamyrrha) octodecimguttata* (L., 1758): *P.n.s.* (La Robla, 20-IX-90).

Eulachnus tuberculostemmata (Theobald, 1915)

This species is distributed in areas around the Mediterranean, living on *Pinus* (mainly *P. halepensis* Mill.) with a sexual phase recorded. It usually feeds on the branches that are one year old or older. It may be harmful as it can produce high levels of infestation (Binazzi *et al.*, 1983). It is not present on its usual host plant in the study area but it was collected from *P. pinaster* (Voznuevo, 7-VI-90). No natural enemy was captured with this species.

Schizolachnus pineti (Fabricius, 1781)

This is a very common holarctic species in Europe which has a sexual phase in this province on the needles of *Pinus* spp., without showing any

specific preference. It was collected from three pine species: *P. nigra* ssp. *salzmannii* (La Robla, 20-IX-90), *P. pinaster* ssp. *atlantica* (La Robla, 20-IX-90) and *P. sylvestris* (La Robla, 16-VI-90).

Natural enemies:

Hym.: *Pauesia unilachni* (Gahan, 1927): *P.n.s.* (La Robla, 20-IX-90); *Praon bicolor* Mackauer, 1959: *P.p.a.* (La Robla, 20-IX-90) and *P.s.* (La Robla, 16-VI-90).

Col.: *Myrrha (Metamyrrha) octodecimguttata* (L., 1758): *P.n.s.* (La Robla, 20-IX-90).

DISCUSSION AND CONCLUSIONS

The conifers which are attacked by the most of the conifer aphid species in the collecting area in Spain are *Pinus nigra* ssp. *salzmannii* and *P. sylvestris,* host plants to six aphid species; *Cinara maritimae* and *C. pinea* are predominating on the former while *C. pini* and also *C. pinea* are more common on the latter.

The most widely distributed conifer aphids in the Province of León (Table 1) are the species of the genus *Cinara,* particularly *C. maritimae,* while within the genus *Eulachnus, E. mediterraneus* is the one which has the widest distribution.

Lastly, we have to point out that the most frequent parasitoids are those which belong to the genera *Pauesia,* especially *P. picta* that preferentially attacks *C. maritimae* and *C. pinea;* we have also to point out that the coccinelids are the most abundant predators and that *Myrrha octodecimguttata* and *Chilocorus bipustulatus* were the most numerics in our collections.

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