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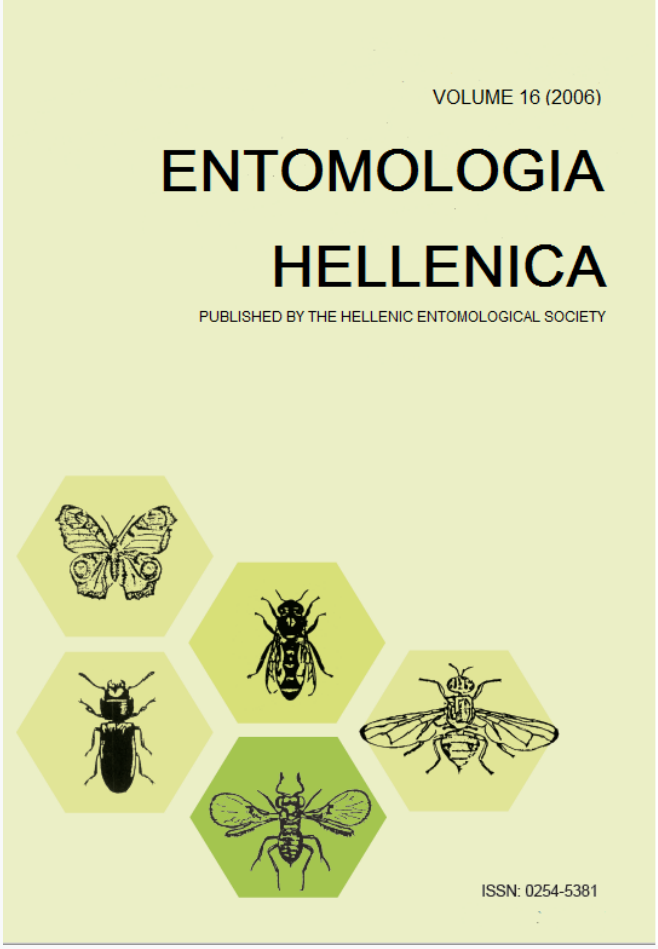

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Chrysomphalus aonidum as a pest of citrus in Greece

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ABSTRACT

The presence of the scale insect *Chrysomphalus aonidum* (Linnaeus) (Hemiptera: Diaspididae), (the Florida red scale) is recorded in Greece and some data on its morphology are given. The coccid was found on the ornamental plant *Dracaena* sp. in Athens in the year 2000 and its rearing on potato tubes (*Solanum tuberosum*) and *Cucurbita maxima* is possible in the insectary. In January 2007 *C. aonidum* was found on heavily infested *Citrus limon* and *Citrus sinensis*, as well as on the less infested ornamental bushes *Ficus benjamina* and *Ligustrum japonicum* in outdoor conditions in the city of Kalamata (Peloponnese – southern Greece). In the past the presence of *C. aonidum* was recorded in Greece, but it was considered an occasional pest of citrus due to its difficulty to become acclimatized.

General remarks – Distribution

The Florida red scale *Chrysomphalus aonidum* (Linnaeus) (Hemiptera: Diaspididae), probably originated from Asia, but has become widely distributed in subtropical countries. Today it is widely dispersed and it has been recorded in several countries of the Afrotropical, Australian, Nearctic, Neotropical, Oriental and Palerctic regions (Ben-Dov and German 2003; Ben-Dov 2006; CAB International 1988; Waterhouse and Sands 2001). It is referred that it infests plants of 69 families where 279 host plant species belong. The most important damage is caused on citrus (Williams and Watson 1988). In the Mediterranean region, it is recorded in Morocco (Balachowsky 1932), Algeria (Balachowsky 1932), Egypt (Ezzat 1958), Israel (Gerson and Zor 1973), Lebanon (Bodenheimer 1926), Turkey (Bodenheimer 1952), Italy (Pellizzari and Vacante 2007), Yugoslavia (Bachmann 1953) and Spain (Garcia Mari *et al.* 2000).

The presence of *C. aonidum* in Greece

In Greece, Koroneos (1934) reported that *C. aonidum* was found on *Citrus* sp. which were imported from Egypt, but it did not become acclimatized in Greece. Argyriou and Mourikis (1981) reported that *C. aonidum* was accidentally introduced in Greece during 1962-1965, but it was under complete control. Thus, later Argyriou (1983) did not include it in a list of 52 scale insects of Greece, neither in a later study (Argyriou 1986) where the major, secondary and minor pest of citrus in Greece were listed.

In April 2000 the scale was found from the senior author on an ornamental plant belonging to genus *Dracaena* (Liliaceae) in a nursery (greenhouse) in Athens. From this population, crawlers were collected and transferred to the laboratory in order to infest pumpkins of *Cucurbita maxima* Duchense (Cucurbitaceae) and tubes of *Solanum tuberosum* L. (Solanaceae). On the infested pumpkins and potato tubes the predator *Rhyzobius lophanthae* Blaisdell (Coleoptera: Coccinellidae) was reared in order to study its morphology and biology (Stathas *et al.* 2002). After the completion of the above experiments the rearing of *C. aonidum* was stopped and since then it was never observed in Greece again.

In January 2007, in the city of Kalamata (Peloponnese – southern Greece), *Citrus limon* Burm and *Citrus sinensis* (L.) Osbeck (Rutaceae) trees were found heavily infested by the scale (Fig. 1a,b). In addition, less infested ornamental bushes *Ficus benjamina* L. (Moraceae) (Fig. 1c) and *Ligustrum japonicum* Thunb. (Oleaceae) were also found near the above infested trees (Fig. 1d).

Epidemiology

From the preliminary observations made in Kalamata it was found that *C. aonidum* infests the leaves (both upper and lower surface) of *F. benjamina* and *L. japonicum* and the fruits of citrus. On the stems of leaves of citrus a small number of dead young nymphs were found. It is a biparental and oviparous species. The population of the scale found on all the host plants in Kalamata from January to April 2007 consisted mainly of young female adults.

Morphology

Some of the data on the morphology of *C. aonidum* mentioned below were observed on a population of the scale found in Kalamata. The scale cover of the female adult has a quite conical shape with a round outline – slightly elliptical. The exuviae have chestnut brown color and they are slightly eccentrically located on the scale cover of the female adult, which has nigrescent – black color. The length of the scale cover of the female adult ranged from 2 to 2.5mm on individuals found on citrus leaves, 2 to 2.2mm on *F. benjamina* leaves and 1.3 to 1.7mm on *L. japonicum* leaves. The body of the pre-ovipositing female adult is slightly elliptic, with the longest axis directed from head to pygidium. The shape of the body later changes and when it becomes an ovipositing female adult, it is rather round and the base of pygidium slightly sinks in the body. The colour of the body is lemon-yellow in all stages and the length of the female adult (found on citrus leaves) ranges from 1.1 to 1.3mm. When the scale cover is lifted, the dorsal side of the body is revealed and the body with the ventral membrane remains in contact with the surface of the host plant.

A permanent slide of female adult of the scale was made and the species was identified by the second author. Then it was added to the collection of the Hungarian Academy of Sciences.

Discussion

Until today, *C. aonidum* was not considered an important pest in Greece, because it was only occasionally recorded infesting citrus and ornamental plants. *C. aonidum* has been recorded to spread more and more on several plants in many countries in Europe. In Spain, it was recorded for the first time recently (Garcia Mari *et al.* 2000). In Italy, Pellizzari (2007) reports that *C. aonidum*, although it was already registered as an enemy of *Dracaena* and *Kentia* in greenhouses, it was found to be acclimatized in Calabria on citrus outdoors in 2006. It is also recently

reported as a new pest in greenhouses in Hungary (Reiderne and Kozàr 1994), France (Germain and Matile Ferrero 2005) and the Netherlands (Jansen 2004).

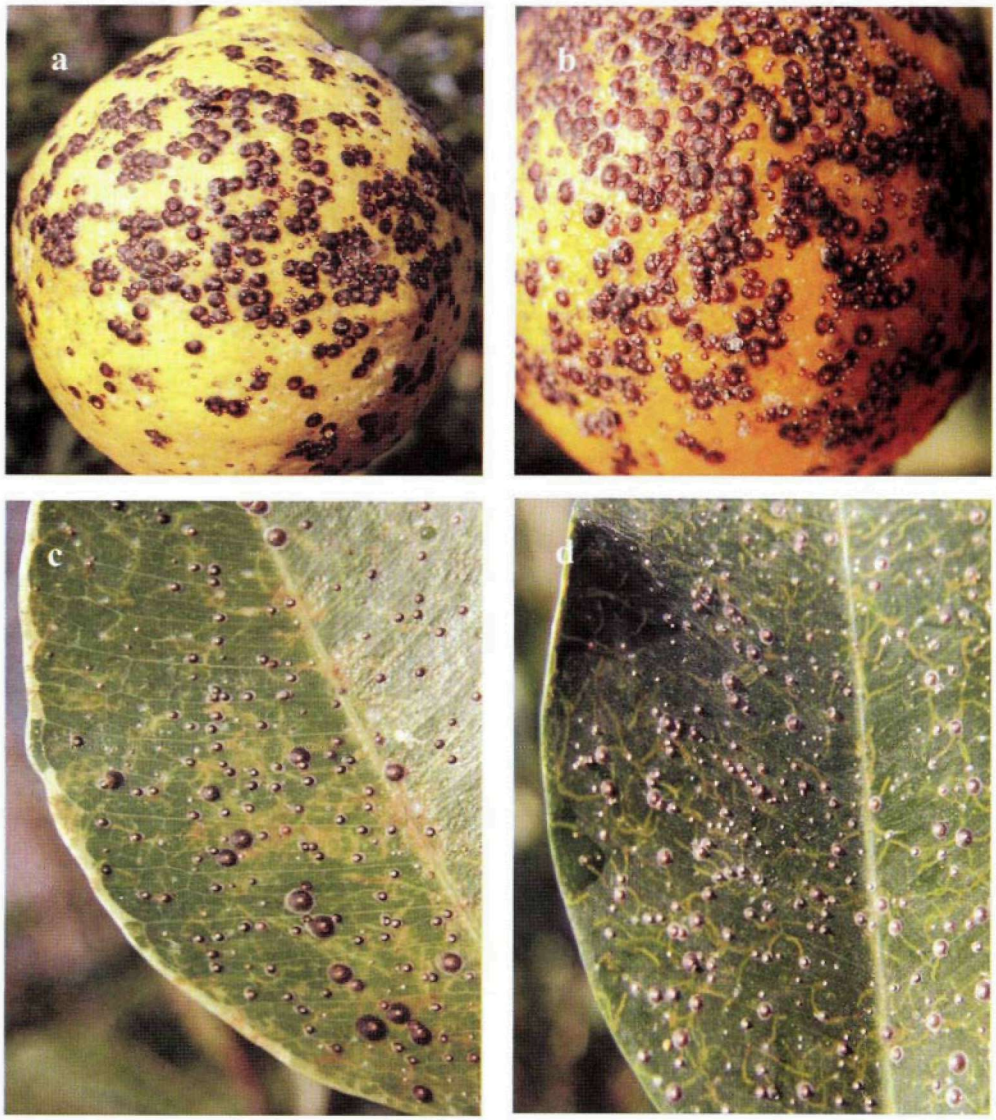

FIG. 1. *Chrysomphalus aonidum* on *Citrus limon* (a), *Citrus sinensis* (b), *Ficus benjamina* (c) and *Ligustrum japonicum* (d).

In literature *C. aonidum* is reported to infest 11 species of genus *Ficus* and another unidentified species *Ficus* sp., but this study in Greece is its first record on *F. benjamina*. Also, it has never been mentioned that this scale infests plants of the

families Cucurbitaceae and Solanaceae, but during this study, the possibility to infest fruits of *C. maxima* (Cucurbitaceae) and tubes of *S. tuberosum* (Solanaceae) was recorded in the laboratory.

Because of its recent wide distribution in Europe and its presence in high populations on citrus in southern Greece, *C. aonidum* might be a new serious threat and it is necessary to start investigating its biology and ecology in the conditions of the country.

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KEY WORDS: *Chrysomphalus aonidum, Citrus limon, Citrus sinensis, Dracaena* sp., *Ficus benjamina, Ligustrum japonicum.*

Το *Chrysomphalus aonidum* ως εχθρός των εσπεριδοειδών στην Ελλάδα

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ΠΕΡΙΛΗΨΗ

Καταγράφεται η παρουσία του κοκκοειδούς εντόμου *Chrysomphalus aonidum* (Linnaeus) (Hemiptera: Diaspididae) στην Ελλάδα και δίνονται στοιχεία της μορφολογίας του. Το κοκκοειδές βρέθηκε σε φυτά *Dracaena* sp. στην Αθήνα το έτος 2000, και διαπιστώθηκε η δυνατότητα εκτροφής του σε κονδύλους πατάτας (*Solanum tuberosum*) και *Cucurbita maxima* στο εντομοτροφείο. Τον Ιανουάριο του έτους 2007 το *C. aonidum* βρέθηκε σε σοβαρά προσβεβλημένα δένδρα *Citrus limon* και *Citrus sinensis*, καθώς και σε λιγότερο προσβεβλημένους καλλωπιστικούς θάμνους *Ficus benjamina* and *Ligustrum japonicum* σε συνθήκες υπαίθρου στην πόλη της Καλαμάτας (Πελοπόνησσος – Νότια Ελλάδα). Κατά το παρελθόν είχε αναφερθεί η παρουσία του *C. aonidum* στην Ελλάδα, αλλά θεωρήθηκε περιστασιακή η παρουσία του στα εσπεριδοειδή λόγω της αδυναμίας εγκλιματισμού του στη χώρα μας.