

SHORT COMMUNICATION

First record of *Lilioceris lili* in Greece**GEORGIOS TH. PAPADOULIS AND ANTONIOS E. TSAGKARAKIS***

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ABSTRACT

On May 2007, the lily beetle *Lilioceris lili* (Scopoli) (Coleoptera: Chrysomelidae) was recorded for the first time in Greece. Its occurrence was observed on scarlet martagon lily and martagon lily plants at Fylakti, Karditsa. Information on its morphology, biology and distribution is presented.

KEY WORDS: beetle, first record, *Lilium chalcedonicum*, *L. martagon*, Lily.

Lilies (genus *Lilium* L.) are bulbous perennial herbs with numerous verticillate or scattered leaves, usually decreasing in size up the stem. Flowers are solitary or in a raceme, erect or nodding, with 6 perianth segments. Style is long and the stigma 3-lobed. Fruit isobovoid capsule with numerous flat seeds. Nine *Lilium* species have been recorded in Europe, five of which can be found in Greece: *L. martagon* L., *L. candidum* L., *L. carnolicum* Bernh. ex Koch, *L. chalcedonicum* L. and *L. rodopaeum* Delip. (Tutin et al. 1991).

The lily leaf beetle, *Lilioceris lili* (Scopoli, 1763) (Coleoptera: Chrysomelidae) is a pest of plants in the genera *Fritillaria* and *Lilium*. It has a widespread Palaearctic distribution being found throughout continental Europe (except Greece) and Russia east through Siberia to Tuva, and south to the Caucasus, Kazakhstan, Xinjiang, Inner Mongolia and in North Africa (Yu et al. 2001, Audisio 2011, Majka and Kirby 2011).

The aim of the present study was to report the first record of the lily beetle, *L. lili* in Greece. The infested plants (scarlet martagon lily, *L. chalcedonicum* and martagon lily, *L. martagon*) (Fig. 1) were located at Fylakti, Karditsa Region, Central Greece on May 9th 2007.

The lily beetle (Fig. 2) occurs from Siberia to Morocco and from the UK to China. Its occurrence in most of the western countries may result from an invasion. It is also non-indigenous to North America (Majka and Kirby 2011).

Its larva is considered as pest on cultivated and wild lilies (*Lilium* spp.), *Fritillaria* spp., *Cardiocrinum giganteum* (Wallich) Makino and *Maianthemum canadense* Desfontaines (Lesage 1983, Livingston 1996, Cox 2001, Haye and Kenis 2004, Ernst et al. 2007). Adults can be found feeding on a wider range of plants (Livingston 1996).

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FIG. 1. Scarlet martagon lily, *Lilium chalcedonicum* L. (Photo: L. Pamperis)



FIG 2. Adults of *L. lili*.

Adults overwinter in soil, litter and debris and emerge in spring to mate and feed on the first leaves of *Lilium* and *Fritillaria*. At 25°C, adults have a pre-oviposition period of about 2 weeks. The first eggs (in rows of 2-16 on the underside of leaves) (Fig. 3) are laid in early April in Massachusetts and the UK, in late April in Switzerland (Livingston 1996, Cox 2001, Haye and Kenis 2004) and in Bosnia and Herzegovina from late of February and March (Brzica 2011). Oviposition occurs from spring to late summer, as long as fresh lily leaves are available. At 22°C, the egg stage lasts 6-7 days (Haye and Kenis 2004). Each female can lay over 300 eggs (Cox 2001). First-instar larvae feed on the leaf surface, whereas older instars feed on the complete leaves, starting from the margin and as the lower leaves are consumed they move upwards to locate undamaged leaves. Fourth instar larvae are covered by a

thick fecal shield and feed on leaves, flowers and buds (Fig. 4). Larval development requires about 3 weeks outdoors. Mature larvae build a white cocoon in the soil, in which pupation occurs. In England (Cox 2001) and also in Bosnia and Herzegovina (Brzica 2011), the new generation adults were observed in mid-June but in outdoor rearing in Switzerland, the first adults appeared on 31 July, nearly 2 months after the larvae had entered the soil (Haye and Kenis 2004). Newly emerged adults first feed on lilies and, perhaps, other plants before finding overwintering sites (Fig. 5). They neither mate nor oviposit before the winter (CABI/EPPO 2012) (Fig. 6).



FIG. 3. Eggs of *L. lili* on the underside of *Lilium* leaves (Photo: S. Kassam).

For the mechanical control of the lily beetle in private gardens, adults, eggs and larvae can be hand-picked and destroyed to reduce pest populations. For high population levels various insecticides can be applied against the lily beetle. Applications of azadirachtin (neem) and imidacloprid provided effective control (Livingston 1996). In Europe, professional lily growers and bulb producers still rely on large-spectrum insecticides used primarily against aphids. The use of insecticides should not be encouraged in private gardens, where hand-picking adults, eggs and larvae can provide sufficient control, especially in Europe where the damage

level is often low. If chemical control is necessary, preference should be given to azadirachtin rather than to more toxic chemicals (CABI/EPPO 2012).



FIG. 4. Larvae of *L. lili* damaging bud (Photo: Thomas Palmer).



FIG. 5. Adult of *L. lili* damaging *L. marta-gon* plant.

Lilioceris lili is currently the target of a biological control program using larval parasitoids from Europe (Kenis et al. 2003, Tewksbury et al. 2005). *Tetrastichus setifer*

(Hymenoptera: Eulophidae) has been released against *L. lili* in New England, USA, and has become established at several release sites, where pest populations have declined (Tewksbury et al. 2005). *Diaparsis jucunda* (Holmgren) and *Lemophagus errabundus* (Gravenhorst) (Hymenoptera: Ichneumonidae) have also been released to complement the action of *T. setifer* and their impact is presently being assessed.



FIG. 6. Adults of *L. lili* mating.

References

- Audisio, P. 2012. *Lilioceris lili* (Scopoli 1763). Fauna Europea, version 2.4. Available from <http://www.faunaeur.org/>
- Brzica, M. 2011. Bio-Ecological research of Lily Leaf Beetle *Lilioceris lili* Scopoli (Coleoptera: Chrysomelidae) in Bosnia and Herzegovina. Entomol. Hell. 20: 55-67.
- CABI/EPPO. 2012. *Lilioceris lili*: Invasive species compendium. Available from <http://www.cabi.org/isc/> Wallingford, UK.
- Cox, M. L. 2001. The status of the lily beetle *Lilioceris lili* (Scopoli, 1763) in Britain (Chrysomelidae: Criocerinae). Coleopter. 10: 5-20.
- Ernst, C., N. Cappuccino and J.T. Arnason. 2007. Potential novel hosts for the lily leaf beetle *Lilioceris lili* Scopoli (Coleoptera: Chrysomelidae) in eastern North America. Ecol. Entomol. 32: 45-52.

- Haye, T. and M. Kenis. 2004. Biology of *Lilioceris* spp. (Coleoptera: Chrysomelidae) and their parasitoids in Europe. *Biol. Control* 29: 399-408.
- Kenis, M., T. Haye, R.A. Casagrande, S.M. Gold and L.A. Tewksbury. 2003. Selection and importation of European parasitoids for the biological control of the lily leaf beetle in North America, and prospects for control in Europe. *Proceedings of First International Symposium of Biological Control of Arthropods (ISBCA)* January 14-18, 2002, Honolulu, Hawaii. USDA Forest Service, FHTET-03-05.
- Lesage, L. 1983. Note sur la distribution présente et future du criocère du lys, *Lilioceris lili* (Scopoli) (Coleoptera: Chrysomelidae) dans l'est du Canada. *Naturaliste Canadien (Revue d'Ecologie et Systématique)* 110: 95-97.
- Livingston, S.B. 1996. Biology, control, and host range of *Lilioceris lili*: a new ornamental pest in the USA. MS thesis. University of Rhode Island, Kingston, Rhode Island, USA.
- Majka, C.G. and C. Kirby. 2011. Lily leaf beetle, *Lilioceris lili* (Coleoptera: Chrysomelidae), in Maine and the Maritime Provinces: the continuing dispersal of an invasive species. *J. Acad. Entomol. Soc.* 7: 70-74.
- Tewksbury, L., M.S. Gold, R.S. Casagrande and M. Kenis. 2005. Establishment in North America of *Tetrastichus setifer* Thomson (Hymenoptera: Eulophidae), a parasitoid of *Lilioceris lili* (Coleoptera: Chrysomelidae). *Second International Symposium on Biological Control of Arthropods, Volume I, Davos, Switzerland - September 12-16, 2005*, 142-143.
- Tutin, T.G., V.H. Heywood, N.A. Burges, D.M. Moore, D.H. Valentine, S.M. Walters and D.A. Webb. 1991. *Flora Europaea*. Cambridge University Press, Cambridge, UK.
- Yu, P., Lu, W. and R. Casagrande. 2001. *Lilioceris lili* (Scopoli) occurs in China (Coleoptera: Chrysomelidae). *Coleopter. Bull.* 55: 65-66.

Πρώτη καταγραφή του *Lilioceris lili* στην Ελλάδα

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ΠΕΡΙΛΗΨΗ

Στην παρούσα εργασία γίνεται η πρώτη καταγραφή του είδους *Lilioceris lili* (Scopoli) (Coleoptera: Chrysomelidae) στην Ελλάδα. Η παρουσία του είδους αυτού διαπιστώθηκε από δειγματοληψία που πραγματοποιήθηκε τον Μάιο του 2007 σε φυτά *Lilium chalcedonicum* L. και *L. martagon* L. στην Φυλακτή Καρδίτσας. Δίδονται πληροφορίες σχετικά με τα μορφολογικά και βιολογικά χαρακτηριστικά, όπως και για την εξάπλωση και αντιμετώπιση του εντόμου.