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LEPTOCYBE INVASA (Hymenoptera Eulophidae),
GALL WASP OF EUCALIPT FOUND IN MONTECRISTO ISLAND
(TUSCANY, ITALY)

SUMMARY

Leptocybe invasa Fisher et La Salle, 2004, native to the Australian Region and since 2001 found in Italy, where it is widespread in all regions where eucalypts are present, is here reported also from the island of Montecristo. Galls of *L. invasa* are globular, often plurilocular and located on sprout, branches, leaf stalks and in the main ribbing of the leaf.

Keys words: *Eucalyptus*, allochthonous insect, new record

RIASSUNTO

Presenza nell'isola di Montecristo di Leptocybe invasa Fisher et La Salle 2004 (Hymenoptera Eulophidae), galligeno di Eucalyptus spp. Viene riportata, per la prima volta nell'isola di Montecristo, la presenza di *Leptocybe invasa* galligeno su *Eucalyptus* spp. La specie proviene dalla regione australiana ed è stata segnalata in diverse regioni italiane a partire dal 2001. Le galle sono globose, spesso pluriloculari, e si rinvengono sui germogli, rametti, piccioli fogliari e nella nervatura principale della foglia.

Parole chiave: *Eucalyptus*, insetti alloctoni, nuova segnalazione.

INTRODUCTION

Eucalypts were introduced into Italy from Australia in the 19th century, and are currently used both as ornamental trees or along roads and as plantations to provide wood or to prevent soil erosion (LA MANTIA, 2013). Insect

fauna of eucalypts in Italy includes species introduced from the Australian Region; among them more recently introduced species are the gall wasps *Ophelimus maskelli* (Ashmead) and *Leptocybe invasa* Fisher et La Salle (Hymenoptera Eulophidae), the psillids *Blastopsylla occidentalis* Taylor and *Glycaspis brimblecombei* Moore (Homoptera Psylloidea), and the bug *Thaumastocoris peregrinus* Carpintero et Dellapé (Hemiptera Thaumastocoridae). Some of them widely spread over many areas where eucalypts are present, mainly due to passive transport.

Among the islands of Tuscany Archipelago (Italy), Montecristo is one of the most far from the peninsular coast and is included in the National Park “Arcipelago Toscano” and in the Natura 2000 network. On 2nd April 2014, during the Workshop “Invasive alien species and major threats to insular ecosystems”, some leaves and buds of *Eucalyptus globulus* Labill. have been collected, bearing galls from which *Leptocybe invasa* adults were previously emerged. The gall wasp is here reported for the first time on the island of Montecristo, where its presence seems to be due to an accidental introduction.

Leptocybe invasa Fisher et La Salle 2004

This gall wasp native to Australia in the last years has been reported from many countries in Africa, Asia, Mediterranean Basin, North and South America (ZHENG *et al.*, 2014). Following the identification keys of BOUČEK (1988), it was first identified as *Aprostocetus* sp. in Italy (Campania and Sicily) by VIGGIANI *et al.* (2002) and BELLA & LO VERDE (2002). After its accidental introduction into some countries of the Mediterranean basin, *L. invasa* has been described as a new genus and species by Fisher & La Salle (in MENDEL *et al.*, 2004). Furthermore, molecular analyses suggested that *L. invasa* is a complex of two cryptic species (NUGNES *et al.*, 2015), the first present in the Mediterranean region and South America, the second in China (MENDEL *et al.*, 2017).

Galls develop in the leaf midrib (Fig. 1), in the petioles and in the juvenile shoots, and are spherical and green in their first developmental stage, becoming bump shape and pink-reddish in the final stage, when the emergence holes of the wasp can be also observed. *L. invasa* reproduction is thelytokous parthenogenetic (MENDEL *et al.*, 2004), adult males can be found occasionally and have been described by DOĞANLAR (2005) and AKHTAR *et al.* (2012). The pest attacks trees of all ages, but the damage is most severe on young plants in nursery stocks and young plantations (JACOB *et al.*, 2015). The management of this pest in its introduced range is difficult, also because conventional control measure like traps or pesticides resulted generally ineffec-



Fig. 1 — *Leptocybe invasa* gall on *Eucalyptus camaldulensis* leaf, note the insect exit holes

tive (BASAVANA GOUD *et al.*, 2010; KULKARNI, 2010; JACOB & SIVAKUMAR, 2012). As biological control is considered the only feasible way to manage introduced pests over large areas, researches have been carried out to identify *L. invasa* parasitoids and to study the biological parameters useful to assess their potential as biological control agents. The parasitic wasps *Quadrastichus mendeli* Kim et La Salle, *Selitrichodes kryceri* Kim et La Salle, *Selitrichodes neseri* Kelly et La Salle (Eulophidae), and *Megastigmus* sp. (Torymidae) have been reported from Australia (KIM *et al.*, 2008; PROTASOV *et al.*, 2008; KELLY *et al.*, 2012). Four parasitoid species were released in Israel: *Megastigmus zvi-mendeli* Doğanlar, *M. lawsoni* Doğanlar (Torymidae), *Selitrichodes kryceri* Kim & La Salle and *Q. mendeli* Kim & La Salle (Eulophidae) (PROTASOV *et al.*, 2008). In Italy only *Q. mendeli* was accidentally introduced and recorded in Portici (NUGNES *et al.*, 2016) whereas no information is available till now about its presence in Sicily (SUMA *et al.*, 2018). Parasitic wasps found to be associated with *L. invasa* in Israel, Turkey, India, Thailand, China are the Torymidae *Megastigmus zebrinus* Grissell, *M. thitipornae* Doganlar et Hassan, *M. dharwadicus* Narendran et Vastrad, *M. viggianii* Narendran & Sureshan, *Megastigmus* spp. and the Eulophidae *Aprostocetus gala* Walker, *A. causalis* La Salle & Wu, *Quadrastichus mendeli* Kim & La Salle (KIM *et al.*, 2008; PROTASOV *et al.*, 2008; DOĞANLAR & HASSAN, 2010; KULKARNI *et al.*, 2010; NAREN-

DRAN *et al.*, 2010; VASTRAD *et al.*, 2010; KELLY *et al.*, 2012; SANGTONGPRAOW & CHARERNSOM, 2013; ZHENG *et al.*, 2016). Moreover, *Megastigmus brasiliensis* Doğanlar, Zache & Wilcken has been recently reared from *L. invasa* galls and described from Brazil (DOĞANLAR *et al.*, 2013).

Because a variable susceptibility of *Eucalyptus* species and clones to *L. invasa* attacks has been observed (JACOB & RAMESH KUMAR 2009; THU *et al.*, 2009), the selection and planting of less susceptible genotypes can be considered an additional option to develop an integrated management strategy (MENDEL *et al.*, 2004; NYEKO *et al.*, 2009; THU *et al.*, 2009; JAVAREGOWDA & PRABHU, 2010; DITTRICH-SCHRÖDER *et al.*, 2012; JACOB *et al.*, 2015).

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