First record of *Pachycrepoideus vindemmiae* (Rondani) (Hymenoptera: Pteromalidae) parasitizing pupae of *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae) in Tunisia

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The Mediterranean fruit fly (Medfly), *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae), is one of the most devastating pests of fruits and vegetables worldwide (Liquido et al. 1991; Chueca et al. 2007). It is the most invasive species of all members of the Tephritidae (Zucchi 2001) and a key pest of citrus and other fruits in the Mediterranean countries, including Tunisia (Enkerlin & Mumford 1997; Jerraya 2003). Serious economic damage is caused by this insect in Tunisia; in mixed fruit cultivation crop losses can be from 80 to 100% (Jerraya 2003). Citrus is the most affected host crop, with direct annual losses attributed to *C. capitata* of up to 38% of annual income from Tunisian citrus production (Driouchi 1990; Lebdi Grissa 2010).

Controlling this pest remains a significant problem when considering the level and abundance of associated fruit damage and the difficulty in implementing effective control interventions. Worldwide, control measures against *C. capitata* are based on the establishment of an integrated pest management (IPM) programme using several techniques, including insecticides (Primo-Millo et al. 2003; Magaña et al. 2007), mass trapping (Katsoyannos et al. 1999b; Navarro-Llopis et al. 2008), the sterile insect technique (Katsoyannos et al. 1999a; Hendrichs et al. 2002) and also biological control using parasitoids (Wharton 1989; Montoya & Cancino 2004; Montoya et al. 2005).

In Tunisia, this pest is currently controlled mainly by means of mass trapping and the use of organophosphate insecticides, especially malathion in bait applications (Boulahia-Kheder et al. 2012). This situation has a negative impact on the country because Tunisia is an exporter of citrus to the European Union, which recommends the use of IPM programmes in agricultural production (European Directive 2009/128/CE).

A great effort is being made in Tunisia to develop an integrated pest management programme, including the use of parasitoids. Parasitoids are widely used against *C. capitata* in many countries, especially in Central and South America (Montoya & Cancino 2004). In the Mediterranean Basin some attempts have been initiated in using parasitoids against this pest, mainly in Spain (Sabater-Muñoz et al. 2013). The use of indigenous natural enemies is a clear priority in the application of biological control; yet, despite the long history of *C. capitata* in the Mediterranean Basin, there were no records on field parasitism by native species until Papadopoulos & Katsoyannos (2003) recorded *Aganaspis dacii* (Weld) (Hymenoptera: Figitidae) parasitizing larvae of *C. capitata* on the Greek Island of Chios. Thereafter, other workers reported natural parasitism of *C. capitata* in Spain (Falcó et al. 2006; Beitia et al. 2007; Pérez-Hinarejos & Beitia 2008; De Pedro et al. 2013). Among these parasitoids, *Pachycrepoideus vindemmiae* (Rondani) (Hymenoptera: Pteromalidae) was mentioned (Falcó et al. 2006).

*Pachycrepoideus vindemmiae* is an idiobiont parasitoid on pupae of a wide range of Diptera species in the families Anthomyiidae, Calliphoridae, Drosophilidae, Muscidae, Sarcophagidae, Tachinidae and Tephritidae (Wharton 1989; Marchiori & Barbaresco 2007; Tormos et al. 2009). Among the Tephritidae, various species such as *Anastrepha fraterculus*, *A. suspensa*, *Bactrocer a oleae* and *Ceratitis capitata* are known as appropriate hosts (Noyes 2002; Ovruski et al. 2006; Beitia et al. 2007). *Pachycrepoideus vindemmiae* is a cosmopolitan species widely distributed through the world (Noyes 2014; Wharton & Yoder 2014), and it has been recorded from Tunisia, where it is a parasitoid...