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Definition of the *concordis* species group of the genus *Euseius* (Acari: Phytoseiidae), with a morphological reassessment of the species included

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Abstract

Phytoseiidae (Acari) is the best known family of predatory mites. Within this family, *Euseius* Wainstein is one of the largest genera. The species of this genus have generalist feeding behavior, including in their diet mites and pollen. Some studies have demonstrated the potential of certain *Euseius* species to control pest mites. *Euseius concordis* (Chant) has been mentioned in the literature as potentially useful for the control of the tomato russet mite, *Aculops lycopersici* (Tryon) (Eriophyidae). Several other American species are morphologically similar to *E. concordis*; the morphological variation of these species is poorly understood. The objective of this study was a taxonomic re-evaluation of *E. concordis* and of the world species most similar to it. Measurements of species collected in this study and a taxonomic key to separate the species of this group are provided. Morphological evaluations confirmed that *Euseius flechtmanni* Denmark & Muma is a junior synonym of *E. concordis*, and determined that *Euseius caseariae* De Leon is also a junior synonym of *E. concordis*, that *Euseius ho* (De Leon) and *Euseius brazilli* (El-Banhawy) are junior synonyms of *Euseius mesembrinus* (Dean) and that *Euseius vivax* (Chant & Baker) is not a junior synonym of *Euseius fructicolus* (Gonzalez & Schuster), as previously thought.

Key words: morphology, synonymy, mites, predator

Introduction

Phytoseiidae (Acari) is by far the best known family of predatory mites (McMurtry *et al.*, 2013). Within this family, *Euseius* Wainstein is one of the largest genera. It was originally described about 53 years ago (Wainstein, 1962) and redescribed by different authors, the most recent redescription being published by Chant & McMurtry (2005, 2007). The genus currently includes 214 nominal species, of which 193 are considered valid (Demite *et al.*, 2014, 2015). Recent taxonomic treatments of this genus (Chant & McMurtry, 2005, 2007) made no attempt to divide it into species groups.

Euseius species have been cited as generalist predators. Their ability to feed on mites has been extensively reported, although pollen from different plants has been considered a potentially important part of their diet (McMurtry *et al.*, 2013). Some of these species can ingest the content of leaf cells of host plants, apparently without causing significant damage (Adar *et al.*, 2012). Several studies have mentioned the potential of *Euseius* to control certain species of pest mites (Moraes & Lima, 1983; Smith & Papacek, 1991; Reis & Alves, 1997; Nomikou *et al.*, 2001; Melo *et al.*, 2009; Toledo *et al.*, 2013; Döker *et al.*, 2014). One of these species, *Euseius gallicus* Kreiter & Tixier, has been used commercially for whitefly and thrips control (Biobest, 2014).

Euseius concordis (Chant) was reported by Moraes & Lima (1983) as a potential control agent of *Aculops lycopersici* (Tryon) (Eriophyidae), a serious pest of tomato in many countries (Jeppson *et al.*, 1975; CABI, 2014). This predator was originally described from specimens collected from citrus in the Concordia region, northern Argentina, and was also reported from several other American countries from the United States to Argentina (Moraes *et al.*, 2004; Demite *et al.*, 2015). There are only two reports of the occurrence of *E. concordis* outside the American continent and Caribbean islands, in Portugal (Carmona, 1962, 1966) and Montenegro (Mijukovic & Tomasevic, 1975), but these reports could be based on misidentifications (Demite *et al.*, 2015).