



## Morphometric differentiation of five biotypes of *Lysiphlebus fabarum* (Marshall) (Hymenoptera: Braconidae: Aphidiinae) in Iran

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### Abstract

Morphometric analyses were carried out on five biotypes of *Lysiphlebus fabarum* (Marshall) (Hymenoptera: Braconidae: Aphidiinae) associated with five host aphid species, *Aphis craccivora* Koch, *Aphis fabae* Scopoli, *Aphis gossypii* Glover, *Brachyunguis zygophylli* (Nevsky) and *Melanaphis sacchari* (Zehntner). Sixteen morphological characters were measured on female specimens of *L. fabarum*. Two multivariate discriminant analyses, discriminant function analysis and Un-weighted Pair Group Method with Arithmetic mean cluster analysis, were employed to discriminate among *L. fabarum* biotypes on a morphological basis. Both discriminant function analysis and cluster analysis revealed significant morphological differences. Specimens of *L. fabarum* reared on *Melanaphis sacchari*/ *Sorghum halepense* association showed clear differentiation from other *L. fabarum* biotypes. A stepwise discriminant function analysis selected Distance between R1-R2 junction and outer margin of wing, Metacarpus length, Width of first tergite, Basal vein length and Femur length that showed the highest contribution to the separation of host-adapted biotypes. A dendrogram of the cluster analysis based on data of squared Euclidean distances classified biotypes in different groups. This study demonstrates that morphometric analysis of morphological characters can efficiently discriminate among host-associated groups based on size variation and clearly separate biotypes of *L. fabarum*. We concluded that *L. fabarum* biotypes are not homogeneous morphological entities, and represent different host-associated forms.

**Key words:** morphometrics, *Lysiphlebus*, host-associated variation, aphid parasitoids

### Introduction

Aphidiinae is one of the most important subfamilies of the family Braconidae (Insecta: Hymenoptera) that its species are exclusively solitary endoparasitoids of aphids and have a great impact on reduction of aphid populations (Mackauer & Starý 1967; Starý 1970, 1988; Kavallieratos *et al.* 2001, 2004). Many species of Aphidiinae are important natural enemies of aphid pests which have been used successfully in biocontrol programs throughout the world (Schmidt *et al.* 2003; Brewer & Elliott 2004; Levie *et al.* 2005). To date around 60 genera and subgenera and more than 400 species of Aphidiinae have been identified worldwide (Mescheloff & Rosen 1988; Starý 1988; Dolphin & Quicke 2001; Kavallieratos *et al.* 2001, 2004). Aphid parasitoids and their aphid hosts have prevalently Northern hemisphere distribution (Mackauer 1968). Studies of the taxonomy of the subfamily Aphidiinae as well as the parasitoid-aphid associations have great importance for successful biological control programs (Hagvar & Hofsvang 1991; Starý 1993; Tomić *et al.* 2005).

The genus *Lysiphlebus* Förster, with about 30 known species worldwide, is one of the taxonomically most difficult and less studied genera within the subfamily Aphidiinae and the tribe Aphidiini (Mackauer 1961; Kambhampati *et al.* 2000; Sanchis *et al.* 2000). There is a poor taxonomic and biological knowledge about this genus. Mackauer (1968) in his revision of the species of *Lysiphlebus* described some new species and a new subgenus. Several species belonging to this genus have been described from European (Starý 1971; Starý & Remaudière 1973; Starý 1985; Starý *et al.* 1998) and Asian countries (Starý 1979; Mescheloff & Rosen 1990; Starý *et al.* 2002).