

Synonymization of key pest species within the *Bactrocera dorsalis* species complex (Diptera: Tephritidae): taxonomic changes based on a review of 20 years of integrative morphological, molecular, cytogenetic, behavioural and chemoeological data

ABSTRACT

Bactrocera papayae Drew & Hancock, *Bactrocera philippinensis* Drew & Hancock, *Bactrocera carambolae* Drew & Hancock, and *Bactrocera invadens* Drew, Tsuruta & White are four horticultural pest tephritid fruit fly species that are highly similar, morphologically and genetically, to the destructive pest, the Oriental fruit fly, *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae). This similarity has rendered the discovery of reliable diagnostic characters problematic, which, in view of the economic importance of these taxa and the international trade implications, has resulted in ongoing difficulties for many areas of plant protection and food security. Consequently, a major international collaborative and integrated multidisciplinary research effort was initiated in 2009 to build upon existing literature with the specific aim of resolving biological species limits among *B. papayae*, *B. philippinensis*, *B. carambolae*, *B. invadens* and *B. dorsalis* to overcome constraints to pest management and international trade. *Bactrocera philippinensis* has recently been synonymized with *B. papayae* as a result of this initiative and this review corroborates that finding; however, the other names remain in use. While consistent characters have been found to reliably distinguish *B. carambolae* from *B. dorsalis*, *B. invadens* and *B. papayae*, no such characters have been found to differentiate the latter three putative species. We conclude that *B. carambolae* is a valid species and that the remaining taxa, *B. dorsalis*, *B. invadens* and *B. papayae*, represent the same species. Thus, we consider *B. dorsalis* (Hendel) as the senior synonym of *B. papayae* Drew and Hancock syn.n. and *B. invadens* Drew, Tsuruta & White syn.n. A redescription of *B. dorsalis* is provided. Given the agricultural importance of *B. dorsalis*, this taxonomic decision will have significant global plant biosecurity implications, affecting pest management, quarantine, international trade, postharvest treatment and basic research. Throughout the paper, we emphasize the value of independent and multidisciplinary tools in delimiting species, particularly in complicated cases involving morphologically cryptic taxa.