



Phylogenetic analysis of *Melolontha* and *Polyphylla* beetles (Scarabaeidae: Coleoptera) from north-western Himalaya, India

Abhishek Rana · Ravinder Singh Chandel · Kamal Dev Sharma ·
Surender Singh Chandel · Kuldeep Singh Verma

Received: 5 May 2021 / Accepted: 8 July 2021
© The Author(s), under exclusive licence to Springer Nature B.V. 2021

Abstract White grub species, *Melolontha cuprescens*, *Melolontha furcicauda*, *Melolontha indica* and *Polyphylla fullo* are serious pests of different crops in north-western Himalaya. None of these species are, however, characterized at molecular level including DNA barcodes. Here we provide DNA barcodes for these species. The adults of these species were collected from different locations of Himachal Pradesh and described by molecular characterization. The mitochondrial *Cytochrome c oxidase I* (*COXI*) and 28S ribosomal RNA (28S rRNA) genes of these species were amplified and sequenced for molecular identification and phylogenetic analysis. The sequences of these genes from other species of these genera and other related genera were also retrieved from DNA databases and included in the analysis. The *COXI* sequences of *M. cuprescens* were 99.88% similar to *P. fullo*, whereas those of *M. furcicauda* were 84.91% similar to *M. indica*. Among retrieved *COXI* sequences, *Melolontha hippocastani* (HM120757 & KX087316) were closer to

M. furcicauda (86.14–86.50%) and *M. indica* (85.74–86.04%) as compared to *M. cuprescens* (81.44–81.47%) and *P. fullo* (81.32–81.47%). Based on 28S rRNA gene sequences, *M. indica* showed 99.42% similarity to *Melolontha melolontha* (EU084231) as compared to *M. cuprescens* and *M. furcicauda* which were distantly related. The *COXI* was a better DNA barcode for the identification of *Melolontha* and *Polyphylla* species. The 28S rRNA has a limited utility in DNA barcoding of *Melolontha* species.

Keyword *Melolontha* spp. · *Polyphylla* spp. · *COXI* · 28S rRNA · Phylogenetic analysis

Introduction

The genus *Melolontha* is a phytophagous scarab group constituting the type genus of the subfamily Melolonthinae and tribe Melolonthini. There are about 60 species/subspecies within the genus *Melolontha* which have been discussed worldwide (Keith & Li, 2005). The *Melolontha* are often recorded as crop pests as foliage feeding adults and root damaging larvae (Liu et al., 1997). Defoliation caused by beetles is usually serious when they feed on the young one or two-years old broad-leaved plantings (Svestka, 2007). On the other hand, white grubs feeding in forest plantations leads to dieback of trees causing serious damage to forest management and may even restrict forest regeneration. In Germany, *M.*

A. Rana (✉) · R. S. Chandel · K. S. Verma
Department of Entomology, CSK Himachal Pradesh
Agricultural University, Palampur, Himachal Pradesh,
India
e-mail: abhir1392@gmail.com

K. D. Sharma · S. S. Chandel
Department of Agricultural Biotechnology, CSK
Himachal Pradesh Agricultural University, Palampur,
Himachal Pradesh, India

Published online: 16 July 2021

Springer

self attested