
Database of DNA barcodes of hoverflies in Serbia—essential tool for environmental DNA survey

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Abstract

A new and common approach in invertebrate taxa detection includes environmental DNA (eDNA) metabarcoding of a fragment of mitochondrial cytochrome c oxidase I gene (COI), using PCR primers designed to target metazoans. This fragment overlaps with DNA barcode fragment (Folmer et al., 1994, *Mol Mar Biol Biotechnol.* 3:294-9), which is the most used primer pair for amplification of DNA barcodes in many animals, including hoverflies. However, the identification of taxa in eDNA samples to species level depends on existing databases. In our recent research during field work conducted in May and June 2022, in total, 90 soil samples were collected and eDNA was extracted. Sampling design included two soil types typical for Vojvodina Province (Republic of Serbia), each represented by three localities. At each locality two agricultural and one natural habitat were selected and at each five replicates were sampled. MtCOI was successfully amplified. Simultaneously, during field work within Serbian Pollinator Advice Strategy (SPAS) Project in a period from April 2022 to June 2022, in the same area, 41 hoverfly species belonging to 21 genera were registered. In order to explore the potential of eDNA metabarcoding for hoverfly species detection in agricultural and natural habitats of Vojvodina Province using eDNA metabarcoding, we did search of NCBI Nucleotide database (<https://www.ncbi.nlm.nih.gov/>) and BOLD System v4 database (<https://boldsystems.org/index.php>). No DNA barcodes in databases were found for four registered species in the area (9.8%): *Cheilosia griseifacies* Vujić, 1994, *Meligramma euchroma* Kowarz, 1885, *Neoascia interrupta* Meigen, 1822 and *Pocota personata* Harris, 1780. In addition, DNA barcodes of only nine registered species (21.9%) from specimens from the same geographical area are present in databases. Thus, in order to increase the resolution of eDNA survey in hoverfly identification, our first step conducted is DNA barcoding of all registered hoverfly species missing DNA barcodes to enrich DNA databases. Acknowledgements: This research was supported by the Provincial Secretariat for Higher Education and Scientific Research of Autonomous Province of Vojvodina (Project title: *Environmental DNA – biomarker of soil quality in Vojvodina*; Grant No. 142-451-2610/2021-1/2), the Science Fund of the Republic of Serbia, Grant No. 7737504, *Serbian Pollinator Advice Strategy – for the next normal – SPAS* and the Ministry of Education, Science and Technological Development of the Republic of Serbia, Grant No. 451-03-68/2022-14/200125

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