

PP-294 [Beekeeping Technology and Quality]

Multiple-metabarcoding assays provides botanical and entomological DNA fingerprints that can reveal the geographic origin of Turkish honey

Anisa Ribani¹, Ayça Özkan Koca², Valeria Taurisano¹, Samuele Bovo¹, Luca Fontanesi¹

¹Animal and Food Genomics Group, Department of Agricultural and Food Sciences, University of Bologna, Bologna, Italy

²Department of Gastronomy and Culinary Arts, Maltepe University, Maltepe-Istanbul, Turkey

Honey is one of the most frauded animal-derived food products. Fraudulent practices often involve dilution with cheap syrups and mislabelling of the botanical, entomological and geographical origins. Turkey is a major player in the global honey market, ranking as the second-largest producer worldwide with an annual production exceeding 100,000 metric tons. Determining and monitoring the geographic origin of Turkish honey is a crucial to ensure its authenticity. To address this issue, we developed multiple metabarcoding assays using a next generation sequencing (NGS) approach to analyse 48 Turkish honey samples. This method provided botanical and entomological information to establish their geographic fingerprinting. The honey samples were collected from various regions of Turkey, each accompanied by detailed geographical and ecological information. Additionally, each sample came with a botanical declaration specifying whether it was monofloral or polyfloral, as well as indications of honeydew presence. The botanical composition was assessed through DNA metabarcoding of informative regions of chloroplast DNA, along with a bioinformatic pipeline that queried a database with over 150,000 plant species. This approach identified the predominant plant taxa in each honey sample, totalling over 1000 different plant groups or species, providing insights into their botanical and geographical origins. The entomological metabarcoding was based on two hemipteran mitochondrial DNA targets that captured information on plant-sucking insects present in the agricultural and forest landscapes where the honey samples were produced. Honeydew-associated insects exhibit host-plant specializations that correlate with different ecosystems. By integrating these metabarcoding assays, we developed a comprehensive system that combines botanical and entomological signatures to verify the geographical origin of Turkish honey. This approach offers valuable information for honey authentication.