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Honey from Natural Park of Montesinho: insights from DNA extraction methodology for botanical identification

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Honey is a sweet natural substance produced by bees from the nectar of plants and/or secretions of living parts of plants. It consists essentially of simple sugars (68%) and water (18%) and smaller quantities of other components such as vitamins, minerals, proteins, organic acids, phenolic compounds, among others [1]. Those are highly dependent of the botanical species visited by bees, conferring to each honey different and distinct organoleptic and biological properties. The botanical differences give rise to two types of honeys, monofloral, consisting essentially of the nectar of a single plant species, and multifloral, arising from several plant species [1]. This strict relation of botanical origin and its biological and organoleptic properties lead to a quality distinction of honey types. There are honeys with high market values due to its particular flavour, taste and specific biological properties, such as monofloral honey and honeys with the denomination of Protected Designation of Origin, such as honey produced in Natural Park of Montesinho. With this, honey is produced and marketed based on its colour, flavour, density and biological properties, being extremely important to assess its quality and authenticity. DNA-based methods are simple, fast and precise promising tools for species identification. However, honey is a complex matrix with high amounts of sugars and other compounds that inhibit the PCR reaction. Thus, it is important to find the best DNA extraction method to achieve good yields and purities. In this work, different pre-treatments were performed and results were compared. For the DNA extraction, a commercial DNA extraction kit was used. The quality of DNA extracts was assessed by spectrophotometry and electrophoresis. Results revealed that the use of ultrasounds in honey pre-treatments achieved the best yields and purity. Additionally, a PCR amplification targeting the gene 18S rRNA was performed to evaluate amplifiability of the extracted DNA. As expected, all extract samples revealed to have amplifiable DNA. Combining a simple and easy honey pre-treatment with an effective DNA extraction method, allows us to get desired good extracts. Thus, this methodology is the first step for further studies involving botanical identification of honey and honey quality studies.

Keywords: Honey DNA, DNA extraction, PCR amplification, botanical identification.

References:

[1] Codex Alimentarius. STANDARD FOR HONEY, CXS 12-19811, Adopted in 1981. Revised in 1987, 2001. Amended in 2019, available at: https://www.fao.org/fao-who-codexalimentarius/codex-texts/list-standards/en/ (Accessed September 05, 2022.)

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