



UNIVERSITY OF LIFE SCIENCES "KING MIHAI I" FROM
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AUTHENTICATION OF HONEY USING MOLECULAR AND PHYSICOCHEMICAL METHODS

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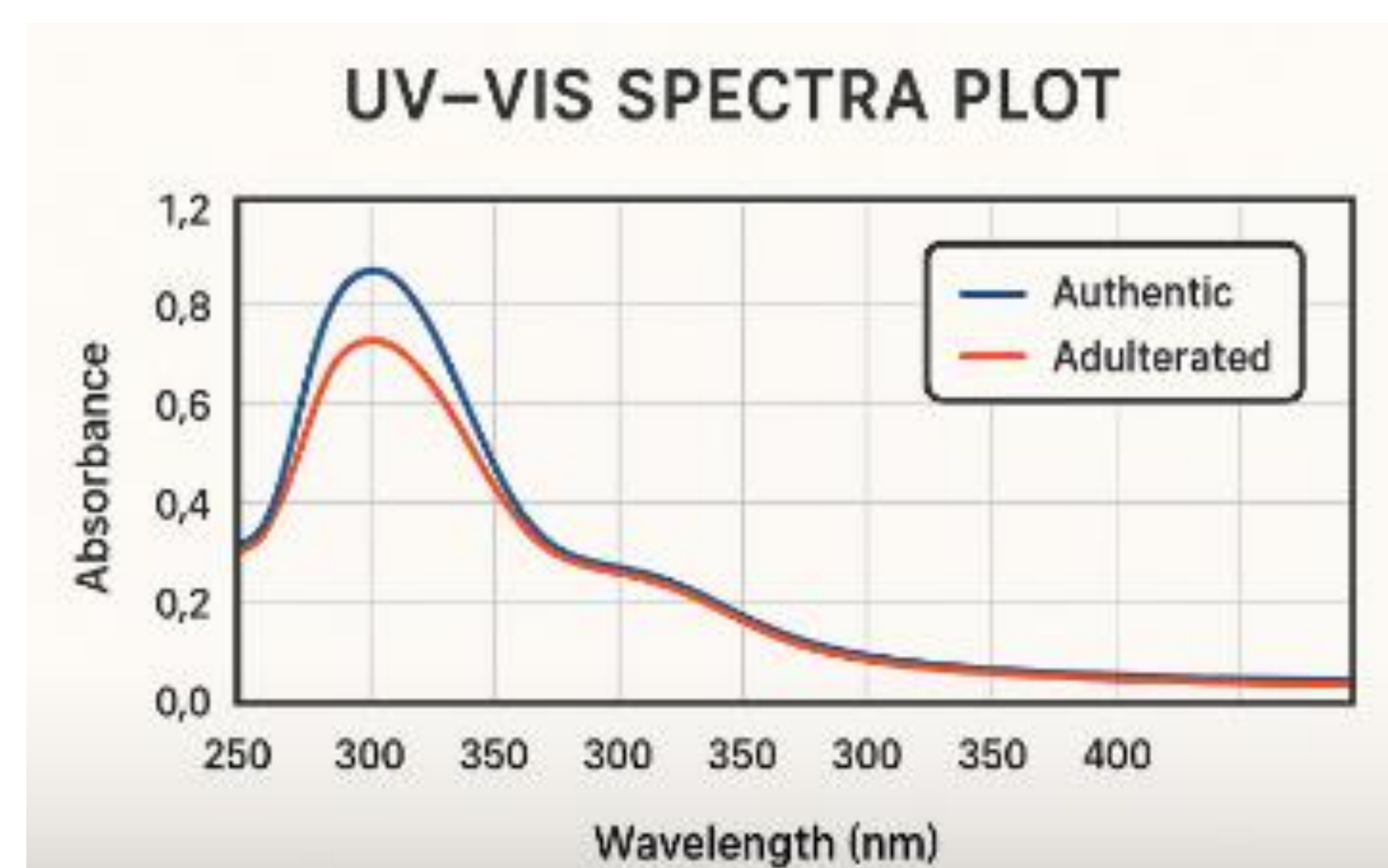
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Abstract: Honey is valued for its nutritional, medicinal, and economic significance. However, adulteration—such as dilution with sugar syrups or mislabeling of origin—poses serious threats to quality and consumer trust. Reliable authentication is therefore essential for food safety, regulatory control, and market integrity. This work reviews the integration of molecular and physicochemical methods, particularly focusing on DNA-based techniques and UV-VIS spectroscopy, as complementary tools for identifying honey origin and detecting adulteration.

• Molecular Approaches

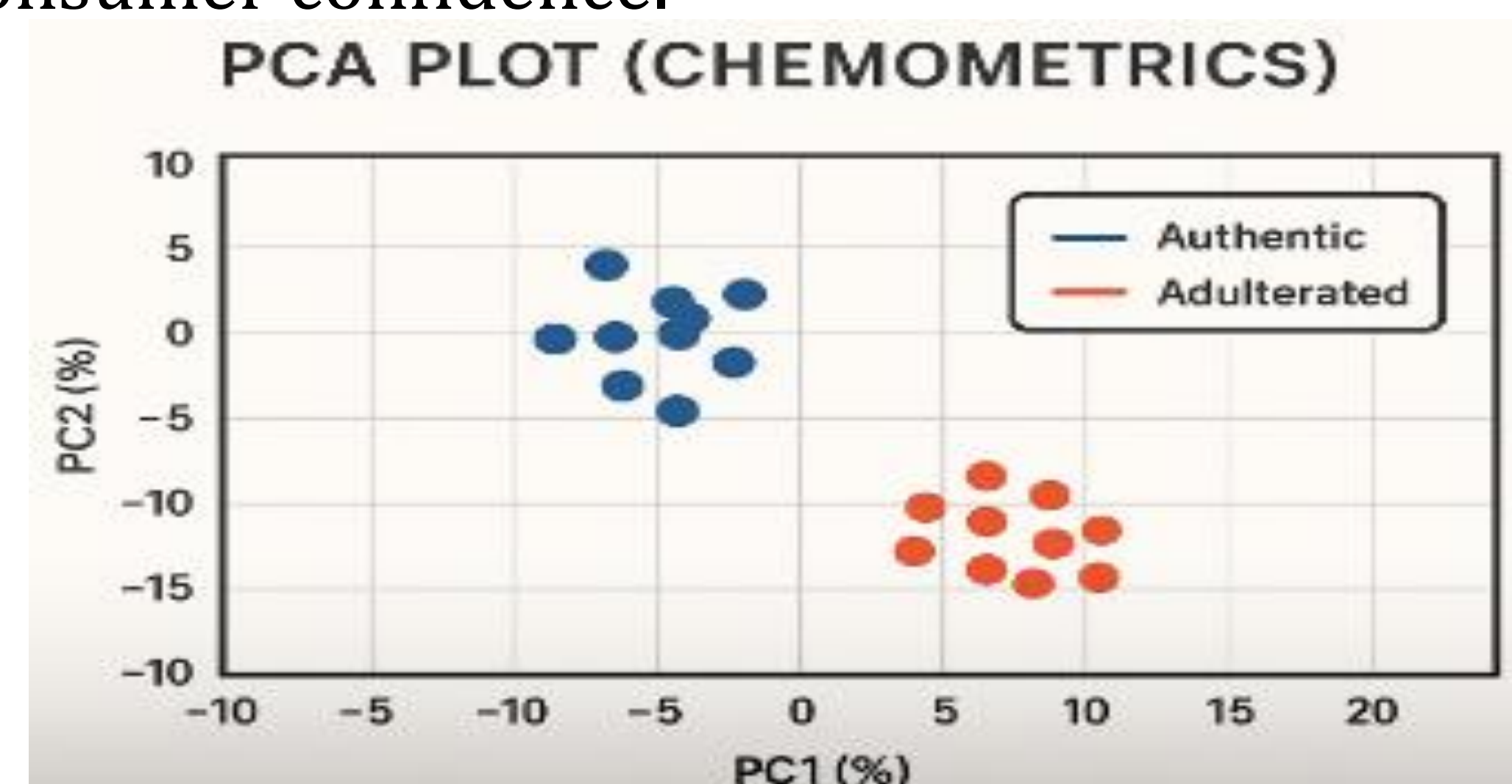
Molecular biology techniques target the DNA of both the honeybee and the floral sources.

- DNA Barcoding
- qPCR
- Next-Generation Sequencing (NGS)



• Integration and Chemometrics

Combining molecular and spectroscopic data enhances the robustness of authentication. Chemometric models (PCA, LDA, PLS-DA) can classify honey samples based on spectral or genetic signatures, improving sensitivity and specificity. These interdisciplinary approaches support traceability, regulatory enforcement, and consumer confidence.



• Physicochemical Methods

Physicochemical analyses characterize honey's chemical composition and isotopic profile.

- IRMS (Isotopic Ratio Mass Spectrometry): Detects C4/C3 sugar adulteration.
- HPLC: Quantifies sugars, phenolics, and flavonoids.
- UV-Vis Spectroscopy: Offers a rapid, non-destructive technique; distinct absorbance bands (200–450 nm) correspond to natural phenolic compounds. Deviations in these spectra can indicate adulteration.

• Conclusions

Integrating molecular biology and physicochemical methods – especially when combined with chemometrics – provides a comprehensive framework for honey authentication. Such approaches ensure accurate determination of origin and detection of adulteration, supporting fair trade and consumer protection. Future work should emphasize standardization, database expansion, and automation of analyses.