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QUALITY AND SAFETY OF HONEY IN CENTRAL ROMANIA

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Abstract:

Honey production remains culturally and economically significant in Romania, particularly in Alba and Hunedoara counties, where the demand for high-quality honey has increased both domestically and internationally. However, the industry faces challenges such as competition from imported honey, health issues affecting bees, and climate change impacts. This study analyzed 32 honey samples from Alba and Hunedoara counties, classified into polyfloral, acacia, and rapeseed honey. The physicochemical parameters analyzed included moisture, diastase index, invert sugar, sucrose, hydroxymethylfurfural (HMF), acidity, and antibiotic residues. The moisture content ranged from 16% to 20%, with polyfloral honey showing the highest levels. Diastase activity ranged from 5.6 to 7.5 Gothe units, confirming adequate enzymatic activity. Invert sugar levels were highest in polyfloral (77%) and acacia honey (76%), while sucrose content remained below 3.9%. HMF levels were low, indicating freshness and authenticity. No antibiotic residues were detected, confirming safety for human consumption. These results align with national standards and European regulations, validating the authenticity, freshness, and safety of Romanian honey. Further studies on a larger sample size are recommended to reinforce the findings. The study highlights the importance of adherence to best practices in honey production and quality assurance to ensure consumer's safety.

Keywords: honey, polyfloral, hydroxymethylfurfural, antibiotic residues, quality assurance.

Introduction

Honey, as defined by Codex Alimentarius, is a natural sweet substance produced by honey bees, primarily *Apis mellifera*, through the collection, processing, and storage of plant nectar. Romania, recognized as one of the top honey producers within the EU, has witnessed a steady increase in domestic honey consumption, although it remains lower than levels observed in Western Europe. Despite Romania's robust production capacity and significant honey exports, the industry faces challenges, particularly with the risk of falsification, including the addition of synthetic sugars. This study analyzes the physicochemical characteristics and purity of three distinct types of honey, assessing their compliance with established quality standards. The findings aim to provide valuable insights for enhancing production practices and ensuring consumer confidence in the integrity of Romanian honey products.

Material and method

Between March 2023 and March 2024, 32 honey samples were collected from Romania's Alba and Hunedoara counties for detailed laboratory analysis. The samples included 16 polyfloral, 12 acacia, and 4 rapeseed honey varieties. Each sample was transported in sterile 500-gram containers to ensure integrity during lab analysis.

The laboratory assessments covered both sensory and physicochemical properties, evaluating parameters, such as: appearance, aroma, taste, water content, diastase index, invert sugar, sucrose, HMF (hydroxymethylfurfural), and acidity. Additionally, antibiotic residues were detected using the CHARM II system to ensure that all samples met rigorous food safety standards. These analyses aimed to confirm the quality, authenticity, and compliance of the honey samples with both national and international safety guidelines.

Conclusions

- Low levels of hydroxymethylfurfural (HMF) suggest the freshness and authenticity of the analyzed honey samples.
- Significant variations in chemical composition reflect the diversity of floral sources and bee habitats.
- The absence of antibiotic residues confirms the safety of the honey for human consumption.
- To increase confidence, further extensive studies with a larger sample size are recommended, correlating with the average annual honey production of beekeepers in the investigated region.

Overall, the results align with national and EU regulations for honey products, including Regulation (EC) No. 852/2004 on food hygiene, and national standards for beekeeping products. These regulatory frameworks ensure that honey produced and marketed meets stringent safety and quality requirements, protecting public health and promoting sustainable beekeeping practices.

Results and discussions

Sensory analysis

- Polyfloral honey: light yellow to golden color, fluid to viscous consistency, floral aroma, sweet and slightly tangy taste.
- Acacia honey: colorless to light yellow, transparent, fluid consistency, mild acacia scent, sweet and delicate taste.
- Rapeseed honey: light yellow to yellow-orange, fluid to viscous, distinct rapeseed aroma, balanced sweetness with slight bitterness.

All varieties of honey met the sensory requirements laid down in the national quality standard.

Physicochemical properties

Moisture content: polyfloral honey (17-20%), rapeseed honey (17-19%), and acacia honey (16-18%), all within the EU limit of 20%.

Diastase index: 5.6-7.5 Gothe units across all samples, meeting EU rules.

Invert sugar: high content in polyfloral (77%) and acacia honey (76%), moderate in rapeseed honey (70%).

Sucrose content: low across all samples, compliant with EU standards (polyfloral: 2.4%, acacia: 2.1%, rapeseed: 2%).

HMF levels: low levels across all types (polyfloral: 0.55 mg/kg, acacia: 0.35 mg/kg, rapeseed: 0.65 mg/kg), well below the EU legal limit.

Freshness (Acidity)

Acidity levels: polyfloral (2.5°), acacia (1.9°), rapeseed (2.2°), all within the EU limit of 5°, indicating freshness and compliance with EU requirements.

Antibiotic residues

All samples were free from antibiotic residues (tested for aminoglycosides, macrolides, sulfonamides, and tetracyclines), confirming adherence to food safety regulations.

