

Міністерство освіти і науки України

Національний університет харчових технологій

89

**Міжнародна наукова
конференція молодих учених,
аспірантів і студентів**

**"Наукові здобутки молоді –
вирішенню проблем
харчування людства у ХХІ
столітті"**

3-7 квітня 2023 р.

Частина 2

Київ НУХТ 2023

Methods for wine fraud detection

Vladyslava Kuzinska, Vira Ischenko

National University of Food Technologies, Kyiv, Ukraine

Introduction. Wine, as well as other alcoholic beverages, is susceptible to falsification. Some of the contributing factors are its complex nature, global supply chains, high market value, and variability in pricing. Fraud detection methods are important for satisfying consumer demand for fine wines [1].

Material and methods. In this study the analysis of modern foreign scientific literature was conducted. The methods that were used are generalization, systematization, specification.

Results. According to the Decernis Food Fraud Database, wine is one of the top three adulterated beverages. Due to the high prices it is a major target for adulteration, which can occur at any point in the production or distribution process. Addition of cheap ingredients, dilution with water, counterfeiting, and mislabeling are the most common types of wine fraud. Searching for exact point of falsification may be difficult, time consuming and expensive sometimes. Nowadays the numerous analytical detection methods that are available for the authentication of wine involve the use of specific marker compounds, measurement of stable isotope ratios, and/or chromatography. They allow to reveal geographic origin, variety, and production method.

Stable isotope analysis is a method that can be used to detect geographical origin, replacement, and dilution. The analysis includes comparing sample stable isotope data with reference data from a wine databank consisting wine with the same origin. Measurement of stable isotope ratios of the biologically important elements, such as H, C and O, for grape products has been adopted officially by European Union regulations in order to detect the addition of water and sugar to the products.

Chromatography is an analytical technique that enables separation of mixture of chemical compounds to find a unique composition. Wine samples can be analyzed for sweeteners and red dyes using chromatography. These substances are sometimes used to adjust the taste and color of wine after dilution with water.

Atomic adsorption spectroscopy and plasma atomic emission spectroscopy can be used to detect trace metals, such as manganese, copper, and iron, accumulation in the soil, leaves, grapes, and irrigation water.

Characteristics of wine, like its grape variety and origin, can be revealed using proton nuclear magnetic resonance spectroscopy (^1H NMR). This method includes comparing data to base spectra from a wine databank. ^1H NMR spectroscopy used to analyze the amount of anthocyanins, country, and vintage of the wine [1].

Conclusions. As wine is a major target for fraud, there is a great need in detection methods. Some of them, like stable isotope analysis, chromatography, proton nuclear magnetic resonance spectroscopy, enable to detect geographic origin, variety, addition of sweeteners, red dyes, and production method. However, further research is needed into noninvasive methods for the authentication of rare wines, as well as development of faster and cheaper techniques.

References

Lin S., Salcido-Keamo S. *Food Fraud. A Global Threat With Public Health and Economic Consequences*, 2021, Elsevier, 415 p.