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ADVANCED STRATEGIES FOR ASSESSING THE QUALITY OF AGRICULTURAL PRODUCTS

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Abstract: *The new developments in the agri-food product market in terms of quality, but also due to changes in the consumer behavior of agri-food products, it is necessary to implement new strategies on this market. These are primarily reflected in assessing and improving the quality of agri-food products. As will be presented in this paper, this evaluation process calls for the continued development of various economically efficient analysis methodologies. Their role is to provide safety, quality and traceability of products in the process of modeling, taking into account the needs of consumers and the legislative framework in place. The present paper will present the latest results with the help of modern science related to food and nutrition. Analytical techniques for assessing the quality of food products will also be presented according to their operating principles as well as other evaluation criteria. As well as methods used for this work, I mention the documentation and dissemination of specialized papers in Romania and abroad. As well as the results obtained, new approaches of the analysis strategies for the evaluation of the quality of the agrifood products will be presented.*

Keywords: *modeling techniques, agri-food products, qualitative strategies.*

JEL Classification: *L15, Q18, O32.*

INTRODUCTION

In order to assess the quality of agrifood products, a continuous development of robust, sensitive and economically efficient analytical methodologies is required to certify food safety, quality and traceability, in line with current legislation and consumer requirements. The development of a modern global agri-food distribution system relies heavily on food quality assessment beyond their simple characterization as a tool for: quality control, new product development, implementation of food safety regulations and rules, and settlement Minuses regardless of their nature. In addition, the huge interest in the sanogenic properties of food is of great interest, as a result of public concern about ways to improve health through so-called functional foods, functional and nutraceutical ingredients. There is no doubt about the necessity and importance of developing new techniques for assessing the quality of agrifood products that are prepared to cope with all present and future challenges. The interaction of modern science with nutrition and food, with disciplines such as pharmacology, medicine or biotechnology, offers a number of impressive opportunities and challenges. Researchers in the field of food science and nutrition go from classical theories to more advanced strategies, borrowing innovative methods, verified from medical, pharmacological and / or biotechnology research. From this research emerged advanced analytical methodologies such as omic and bioinformatic approaches - commonly used in conjunction with in vitro and in vivo techniques and / or clinical trials that were applied to investigate food and nutrition science topics that a few Nor were they intangible now becoming applicable.

In the modern approach to food science and nutrition, terms such as: utrigenomic, nutrigenetic, transgenic, nutritional genomics, functional foods, genetically modified products, nutritranscriptor, nutriproteomic, biological systems are in the process of expansion.

The classification of analytical techniques for assessing food quality according to their operating principle is as follows:

Mass Spectrometry (MS)

Nuclear Magnetic Resonance (NMR)

Infrared Technology (infrared -IR)

Atomic Spectroscopy (atomic spectroscopy -AS)

Immunological Techniques (ELISA)

Biological Techniques: Polymerase Chain Reaction (PCR)

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Biosensor Techniques

Electrochemical techniques for separation (High Performance Liquid Chromatography - HPLC),

Gas Chromatography (GC);

Capillary Electrophoresis (CE) Capillary Electrophoresis;

Supercritical Fluid Chromatography (SFC) chromatography;

Extraction of Supercritical Fluid Extraction (SFE);

Flow Injection Analyzes (FIA);

Flow Injection Analysis (PAT)

Microwave Assisted Extraction (MAE)

Techniques by Automatic Thermal Desorption (ATD)

Connected techniques (coupled operation of separation techniques and spectroscopic techniques).

MATERIAL AND METHOD

In this paper the main method of dissemination of existing information in the literature, both international and local, related to the techniques of evaluation of the quality of agro-food products will be used as the main method. Emphasis will be placed on the progress made in recent years in the field of quality management strategies, aiming at highlighting the benefits these innovative techniques can bring to the final food product.

RESULTS AND DISCUSSIONS

From the literature, the chromatographic separation based on the most numerous applications, using the various chromatographic liquid formats, including hydrophilic interaction chromatography, nano-liquid chromatography or counter-current high-velocity chromatography, few.

We can enumerate other techniques such as: gas chromatograph, which plays a very important role in food analysis (for the analysis of volatile fractions or fatty acids in food)

In recent years mass spectrometry in the evaluation of the quality of agrifood products has evolved greatly, which deserves a careful analysis.

In the 1990s, this technique was most commonly used as a gas chromatograph detector to confirm the identification of analytes. Mass spectrometry has been used over the past decade to directly identify and quantitate food compounds, usually coupled with other separation techniques, such as liquid chromatography and, to a lesser extent, capillary electrophoresis. Quadrupole mass spectrometry was limited to screening, as these instruments are not in line with the most current conditions set by regulations for agri-food products, especially those relating to the number of identification points.

Mass Spectrometry Tandem Detection (SM-SM) Mass Spectrometry Technique has improved selectivity, can help simplify the extraction procedure if attention is paid to ion suppression phenomena.

Triple quadrupole analyzers, ion trap and latest time of flight are currently being used.

Other applications of mass spectrometry include the following: analysis of pesticides and their metabolites for food and water brands, analysis of food and peptide proteins, basic analysis methods for characterization of genetically modified crops, analyzes of MALDI-TOF mass spectrometer for proanthocyanidines from Plants or multistage mass spectrometry to assess the quality, safety and origin of food.

Spectroscopic techniques are based on the principle that molecules and atoms can interact with electromagnetic radiation. These techniques are of great importance in assessing the quality of food, and they are very used because of the speed at which the results are obtained, offering the direct dimensioning of food constituents, do not involve toxic reagents and solvents, they can be used in

linear processes, Are destructive, are non-invasive, and some of them can detect multiple components at once.

The techniques for assessing the quality of the agri-food products mentioned above have enabled a large number of possibilities in food analysis to be created. A concrete case is online mass spectrometry mass spectrometry or mass spectrometry (SM-SM) tandem that has been applied on a large scale to ensure food safety, especially in the analysis of residues of antimicrobial agents in food of animal origin, Antibiotics from food samples, clenbuterol residues, food allergens.

Developments in this area have made remarkable progress in:

- 1) DNA-based techniques and molecular methods that have allowed sensitive and rapid detection of Salmonella in food or microbial composition for different foods
- 2) Biosensors, which are analytical analyzers, composed of a biological recognition element coupled to a chemical or physical transducer that converts the chemical signal into an electrical response.
- 3) Use of nucleic acid peptide technologies for food analysis and food authentication or the development of new immunological methodologies for the analysis of residues of veterinary medicinal products in food or for the analysis of residues of veterinary medicinal products in foodstuffs or characterize herbal food allergens.

As mentioned above, because of the stricter food safety requirements, creating conditions for the unprecedented development of analytical tools and methodologies for analyzing pathogens generating food poisoning, contaminants, and the effect of agri-food products processing (fruit and vegetables) containing pesticide residues.

At present, there are important concerns about the evaluation of agri-food products not only as a source of energy but also as a natural source of valuable components that can provide additional health benefits, following this trend emerged new terms such as functional foods, Functional or nutraceutical ingredients that are currently used in many laboratories around the world that investigate the linkages between the composition of foods and their benefits for human health.

Analysis strategies have changed significantly over the past 15-20 years, due to the following approaches:

- new analytical techniques such as comprehensive gas chromatography;
- solvent-free sample preparation techniques;
- fast gas chromatography with related techniques;
- Data generation strategies that produce a higher level of information analysis and dissemination;
- New operational strategies, based on approaches developed for other areas, and applied to analyze food.

CONCLUSIONS

Food research has evolved considerably over the last 10 years, focusing on multidisciplinary approaches that include: physics, chemistry, physiology and psychology to study food fractionation, sounds during biting and mastication, microstructure, muscle movements During mastication and swallowing and food acceptability.

Most studies have highlighted: the use of molecular techniques for the detection and characterization of pathogens generating food poisoning; The use of molecular, biological and immunological techniques for food chemistry; Mass spectrometry in food safety; Food analysis tools, dairy analysis, preserving and preserving identity and traceability for cereals, food contaminants, antibiotic residues in food, and fortified foods with vitamins. Many studies have focused on the use of Fourier transform infrared spectroscopic technique for authentication and rapid detection of food alteration; Over time the nuclear magnetic resonance domain applied to food; On biosensors connected to functional food safety; On the use of advanced analysis and methods of separation in food assessment; In identifying allergens in food; On the study of natural bioactive compounds and nutrigenomics.

The development of biological sampling techniques is the most important current and prospective trend compared to the previous period, along with the significant decrease in the use of

radiochemical and thermal techniques, probably due to the specific information provided on a large scale by new and advanced technologies, Capable of providing more faithful and sensitive information. Well-established techniques such as separation techniques continue to be used to a large extent, but are overcome by spectroscopic techniques that are currently the most widely used in food analysis.

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