

Fingerprint concept in context of Food Safety and Biosecurity. Short communication

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Abstract

Accelerated growth of food supply and mobility, an effect of globalisation, is a main food security and biosecurity issue. Specialized studies confirm that causal determinants of fingerprinting are geographical and genetic origin. Indicators for assessing the impact of agricultural practices, processing and/or storage on chemical/sensory composition, identification of new bioactive compounds, food fingerprint generators. In response, new approaches from perspective of molecular biology, enzymology (e.g. genomics, proteomics, metabolomics ((fingerprinting markers), "come to rescue" and complement classical fingerprinting methodologies for verifying claims about the origin and nutritional availability of a food. In the last decade, proteomics (= analysis/identification of proteins as fingerprint markers, from a defined biological system) has been applied to various research areas in area of food technologies. Since proteins can be used as markers for a wide range of food attributes, "signalling point transformations" induced by processing operations, they can be additional evidence of food safety/biosecurity.

Keywords: fingerprinting, biosecurity, fingerprinting markers.

1. Introduction

„The consumer has right to information and knowledge of raw, structural components of food matrix (proteins, carbohydrates, lipids, mineral elements, vitamins, water, enzymes, etc.), but also of auxiliary ones (dyes, sweeteners, preservatives, additive with various functions, food biocides, etc.), which compete in the sensory and nutritional definition of food.

Food fingerprint identification is a laborious process of validating the origin of food, raw material, constrained also by peculiarities of technological manufacturing process. As contributing factors to food safety and biosecurity we can list: soil; metabolism (a wide range of chemical compounds/individuals, of different concentration and solubility) [1]; physicochemical evaluation, sensory interpretation (combined physical/psychological response (aroma, taste, texture, temperature, conditions, appearance, etc.)),

having as "standard" memory previous meals; microbiota fingerprint (microbial species identified on food are assumed to be specific to the geographical area of origin) [2]. Tools for spatio-temporal identification of food origin. Accelerated growth of food supply and mobility, an effect of globalisation, is a main food security and biosecurity issue [3]. Specialized studies confirm that causal determinants of fingerprinting are geographical and genetic origin [4, 5, 6]. Biosecurity problems can be solved by "elementary" fingerprinting (*chemical individuals*), regarding discrimination of geographical origin, organic/conventional production [7]. Indicators for assessing the impact of agricultural practices, processing and/or storage on chemical/sensory composition, identification of new bioactive compounds, food *fingerprint* generators. In response, new approaches from perspective of molecular biology, enzymology (e.g. *genomics*, *proteomics*, *metabolomics* ((fingerprinting

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markers), "come to rescue" and complement classical fingerprinting methodologies for verifying claims about the origin and nutritional availability of a food. In the last decade, proteomics (= analysis/identification of proteins as fingerprint markers, from a defined biological system) has been applied to various research areas in area of food technologies [8, 9]. Since proteins can be used as markers for a wide range of food attributes, "signalling point transformations" induced by processing operations, they can be additional evidence of food safety/biosecurity.

Statement that provides an overview that meets the needs of process management, "correcting" disadvantages and challenges generated by fingerprinting and evaluating food attributes. Currently, although international/national regulatory

institutions have established rules on food labeling, it is almost impossible to identify and guarantee the true origin of structural components of a food, especially those that are advanced processed. Development of new bioinformatics tools for fingerprinting the food matrix will play a decisive role in ensuring food safety and biosecurity from a consumption perspective" (Communicated within the framework of the conference INTERNATIONAL SCIENTIFIC SYMPOSIUM "Young Researchers and Scientific Research in Life Sciences for Bachelor, Master and Ph.D. Students", Section: Food Engineering, 16-17 November 2023).

Biosecurity problems can be solved by "elementary" fingerprinting (chemical individuals), regarding discrimination of geographical origin, organic/conventional production (Fig. 1).

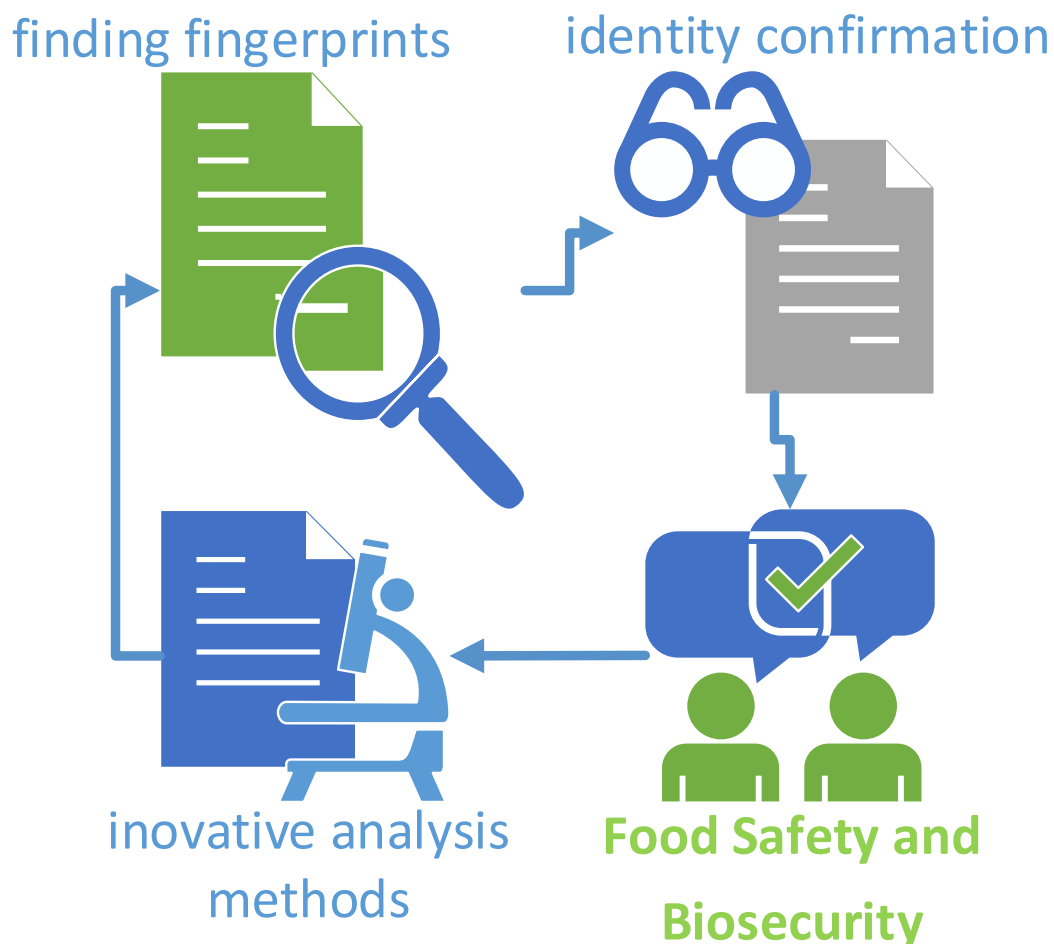


Figure. 1. Interrelation fingerprint-food safety and biosecurity

Conclusions

Currently, it is almost impossible to identify and guarantee the true origin of structural components of food. Development of new bioinformatics tools for fingerprinting the food matrix will play a decisive role in ensuring food safety and biosecurity from a consumption perspective.

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Compliance with Ethics Requirements. The authors declare that they comply with the Ethics requirements of the journal. The authors declare that they have no conflicts of interest and that all procedures involving human or animal subjects (if any) comply with specific regulations and standards.

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