

Chapter 22

Farm-to-Fork

Traceability

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ABSTRACT

The chapter addresses the significance of food traceability in the food system because, in an era where consumers demand transparency in the food supply chain, traceability emerges as a pivotal solution, ensuring food safety and the quality of food products. It also draws attention to the possible health risks and outbreaks that are associated with foods along with current challenges in ensuring food traceability to combat these health risks and outbreaks. Key components of farm-to-fork traceability are different food analysis techniques such as high-performance liquid chromatography, Raman spectroscopy, next-generation sequencing, DNA sequencing, and enzyme-linked immunosorbent assay have been proposed to trace pathogens and pesticide residues to ensure food safety and quality.

INTRODUCTION

Food safety is an important tool for human health as food is a complex biological product. World Health Organization reported the death of almost 1.5 million human beings suffering from diarrhea which is caused by food contamination. Food quality is checked based on the ingredients used in production, processing, and handling

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(D. Singh et al., 2017). Food safety, whether it exists or not, might end up being a crucial limiting factor that impacts global commerce. Consumer knowledge of food safety-related concerns has increased as a result of extensive media coverage. Consumers want additional information on the food products' origin (Füzesi et al., 2018). Numerous issues have been engaged, such as the intricate relationships between value chains, ecosystems, public health, and consumption habits (Fiore et al., 2022). Food traceability refers to the logistical aspect of managing, capturing, storing, and transmitting data regarding feed, food, and food-producing animals throughout the whole food supply chain in order to evaluate the food product's safety (Bosona & Gebresenbet, 2013). The US Food and Drug Administration (FDA) uses the history of food products to check if any suspected factor to be connected to a threat to health problems (Islam & Cullen, 2021). The system of food traceability can minimize information asymmetry, and help in increasing consumer faith in food safety (Anastasiadis et al., 2021). Food product labeling is a significant means for customers to access information regarding the food quality and safety (Ingrassia et al., 2017). There are some techniques and other methods that are used for improving food safety by traceability including molecular techniques with the potential to be utilized in the identification of a foodborne disease precisely. Specifically, whole genome sequencing gives the chance to identify precise differences within organisms, aiding in the assessment of the rise of a specific pathogen type before an outbreak occurs (Ricke et al., 2015). Chromatography is extensively used in the food safety process. High-performance liquid chromatography (HPLC) and similar techniques have become the predominant methods for analytical separation used in food industries (Jedrzejczuk et al., 2001b). Raman spectroscopy has the potential to revolutionize food quality and safety assessment and Raman spectroscopic methods enhance the abilities of detection of food contaminants (Petersen et al., 2021). The science of food microbiology has come to accept microbial genome sequencing due to advancements in data quality and sequencing speed. Next-generation sequencing (NGS) is the collective term for these sequencing technology developments. The use of NGS technology is widespread in the identification of various food microbial issues (Jagadeesan et al., 2019). The technique of Enzyme-linked immunosorbent assay (ELISA) employs a sensitive immunological reaction, and this technique has various applications in food safety and analysis (Sengupta et al., 2021). Sensory evaluation is one of the key methods in judging of food quality and safety, it is a technique for evaluation that uses human participants with specialized knowledge (Djekic et al., 2021). Electronic noses and electronic tongues are also important tools in assessing the food safety and quality in daily life. These tools are intelligent analysis equipment that imitates human taste or smell. They can achieve the objectification of sensory evaluation (Lu et al., 2022). These advanced techniques help in food safety and quality. Figure.1 represents the graphical abstract of chapter.

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