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Non-Thermal Food Processing Technologies for Quality Preservation

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Abstract

Non-thermal food processing technologies use physical methods other than heat to ensure food safety and extend shelf life while preserving nutritional and sensory quality. These technologies minimize heat-induced damage and support the production of fresh-like foods. Non-thermal methods are increasingly adopted in modern food systems to meet consumer demand for minimally processed products. This article discusses the role of non-thermal food processing in quality preservation and food safety.. This article discusses the importance of food texture analysis and its role in ensuring food quality and consumer satisfaction. This article discusses the role of protein characterization in modern food science and food product development. This article discusses the role of food fortification in promoting nutrition security and public health.

***Keywords:** Non-thermal processing, High-pressure processing, Cold plasma, Food safety, Quality preservation*

Introduction

on-thermal food processing technologies are designed to inactivate microorganisms and enzymes without the application of high temperatures. Methods such as high-pressure processing, pulsed electric fields, ultraviolet light, and cold plasma are widely studied for their ability to preserve food quality while ensuring safety [1]. These techniques reduce thermal degradation of nutrients and sensory attributes. Scientific research has demonstrated that non-thermal technologies effectively control microbial contamination while maintaining fresh-like characteristics of foods [2]. These methods support the production of minimally processed products with extended shelf life [3]. Non-thermal processing also contributes to energy efficiency and sustainable food production. Advancements in equipment design and process optimization have improved the industrial feasibility of non-thermal technologies [4]. Regulatory frameworks guide the safe implementation of these processes in food production systems [5]. Thus, non-thermal food processing represents a promising direction for future food preservation technologies. [5]. Therefore, bioactive compounds represent a vital intersection between nutrition, food science, and

preventive healthcare [2]. Bioactive compounds are non-nutrient components in foods that influence physiological processes and promote health. These substances include polyphenols, flavonoids, carotenoids, peptides, and phytosterols, which exert protective effects against various diseases. Their biological activity makes them valuable components of functional foods. Therefore, bioactive compounds represent a vital intersection between nutrition, food science, and preventive healthcare.

Conclusion

Non-thermal food processing technologies offer effective solutions for ensuring food safety while preserving quality and nutritional value. By minimizing heat damage, they support the production of fresh and minimally processed foods. Continued research and technological development will expand their role in sustainable and innovative food systems. Continued scientific research and regulatory oversight will strengthen the credibility and impact of nutraceuticals in global health systems. When used responsibly and regulated effectively, they contribute to product stability and consumer satisfaction. Ongoing research and regulatory oversight are essential to ensure the safe and beneficial use of food additives in the global food industry.

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