

Food Toxicology and Its Role in Assessing Chemical Risks in Food

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Abstract

Food toxicology is a specialized field of food science that focuses on the study of toxic substances present in food and their effects on human health. These toxic substances may arise from natural sources, environmental contamination, agricultural practices, or food processing. Understanding toxicological risks is essential for ensuring food safety and protecting public health. This article discusses the importance of food toxicology in identifying, assessing, and managing chemical hazards in the food supply. Improper post-harvest practices can lead to significant food losses, reduced nutritional value, and economic challenges. The application of appropriate post-harvest technologies enhances food safety, extends shelf life, and ensures year-round availability of food products. This article discusses the role of post-harvest technology in improving food quality and reducing post-harvest losses.

Keywords: Food toxicology, Chemical hazards, Food contaminants, Risk assessment, Public health

Introduction

Food toxicology examines the presence and impact of toxic substances in food, including natural toxins, environmental pollutants, pesticide residues, and processing-induced contaminants. Exposure to these substances can lead to acute or chronic health effects, making their detection and control a major public health priority [1]. Toxicological evaluation provides the scientific foundation for identifying harmful compounds and understanding their biological effects. Environmental contamination from industrial activities, agriculture, and waste disposal contributes significantly to chemical hazards in the food chain. Post-harvest technology encompasses a range of practices designed to preserve the quality and safety of agricultural produce after harvesting. Fruits, vegetables, grains, and other commodities are highly perishable and susceptible to mechanical damage, microbial spoilage, and physiological deterioration [1]. Additives can be derived from natural or synthetic sources, depending on their intended application and regulatory approval. Preservatives are among the most widely used food additives, as they inhibit microbial growth and delay spoilage in perishable foods [2]. Chemical indicators such as lipid oxidation and enzymatic activity also play a significant role in determining shelf stability, particularly in fat-rich

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and processed foods [3]. Sensory evaluation complements analytical methods by assessing consumer acceptability in terms of taste, odor, color, and texture [4]. Shelf-life studies are also important for regulatory compliance, as food manufacturers must provide accurate expiration dates and storage instructions based on scientific evidence [5]. Together, these approaches ensure that shelf-life evaluation supports food safety, quality control, and consumer trust.

Conclusion

Food toxicology plays a crucial role in identifying and managing chemical risks in the food supply. By providing scientific evidence for risk assessment and regulation, it supports the protection of public health. Continued research in food toxicology is essential for addressing emerging contaminants and ensuring long-term food safety. Their successful application requires careful formulation, scientific validation, and regulatory compliance. Ongoing research will further expand the use of natural preservatives in sustainable and health-oriented food production. Food additives play a significant role in improving food quality, safety, and shelf life in modern food 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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