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## INTRODUCTION

### **Food science at a crossroads: innovation, functionality, and the future of food technology**

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The modern food technology landscape is broad, technically demanding, and still expanding. Although this discipline has never been static, the pace and character of its current evolution seem to differ qualitatively from previous decades. The primary tasks of product preservation, safety, and shelf life have expanded rapidly into areas that would have seemed peripheral to earlier generations of food scientists. Approaches that enable targeted modulation of nutritional profiles, the rational use of fermentation to improve functionality, post-harvest management of bioactive compounds, and the design of products for specific physiological outcomes are no longer niche research topics – they now define the core of the field.

The chapters collected in this volume reflect that shift. They do not follow a single unified theory or rely on a common method; rather, they present results from independent research groups working on diverse problems. These include the enrichment of dairy-plant formulations with polyunsaturated fatty acids, the sensory and safety dimensions of mite-ripened artisanal goat cheeses, postharvest treatments for sweet cherry and asparagus, sourdough fermentation in wheat bread, the incorporation of oyster mushroom paste and goji berries into conventionally defined product categories, the stability of frozen and dehydrated preparations, and the emerging science of plant-based frozen desserts. What connects these studies is a shared orientation: a willingness to interrogate existing formulations and technologies, and to ask how they can be improved – nutritionally, functionally, economically, or in terms of consumer acceptability.

A few chapters here provide bioactive compound profiling and analyze biochemical shifts under different cultivation, processing and preservation conditions – data, critically necessary for systematic approach to improving product shelf life and safety. In the chapter on frozen plant-based desserts empirical results the physico-chemical analysis is combined with a SWOT-based assessment of market positioning – a methodological choice that reflects the practical pressures under which much contemporary food research is conducted.

Similarly, several of the contributions engage, in different ways, with the tension between novelty and standardization. Introducing mushroom paste into bread,

or fermented legume sauces into the HoReCa supply chain, is not merely a matter of adding an ingredient; it requires demonstrating that quality parameters remain within acceptable limits, that the technological process is reproducible, and that the resulting product can be positioned meaningfully within existing regulatory and market frameworks. This type of work is often overlooked in favor of more visible, high-profile innovations. However, it is careful, empirically grounded effort that makes new formulations viable in practice, and therefore several chapters in this volume are dedicated for such an applied research.

The attention paid to by-product valorization and resource efficiency across several chapters deserves particular mention. The use of mushroom processing residues, the application of organic acid solutions in hydrocooling, the development of fermented sauces from legumes and pseudo-grains – these are not merely cost-reduction strategies. They reflect a broader rethinking of what counts as a raw material, and a growing awareness that the food industry’s environmental footprint is itself a legitimate object of technological intervention. Whether this constitutes a coherent paradigm shift or a collection of pragmatic responses to economic and regulatory pressure is a question the reader may wish to consider.

The editors thank the contributing authors for their work and for their patience with the editorial process. This volume makes no claim to comprehensiveness; the field is too large and too rapidly evolving for any single collection to capture it fully. What it does offer is a cross-section of current research that is, we believe, representative of the directions in which food technology is moving – and of the rigor with which that movement is being documented.