INTRODUCTION

Innovations for the sustainable development of food systems

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In modern world, the food industry finds itself at the intersection of scientific and technological progress, environmental challenges, and increasing consumer demands. Issues of food safety, quality, and functionality are of particular importance in the context of ensuring food security, supporting healthy lifestyles, and preserving natural resources. Urbanization, climate change, demographic shifts, and pandemics necessitate new approaches to the production, processing, and storage of food raw materials. These global challenges require researchers and practitioners to develop innovative, environmentally sustainable, and economically viable technologies.

In this context, the collective monograph *"Innovative approaches in food processing and sustainability"* is devoted to reviewing, analyzing, and summarizing recent advances in food technology aimed at improving product quality, functionality, and safety. Particular attention is given to the development and implementation of innovative solutions across various sectors of the food industry – from the production of gluten-free products and functional beverages to the efficient utilization of secondary raw materials and reduction of food losses.

This publication draws on the principles of sustainable development and reflects key global trends in the food sector. Among the main directions shaping modern food production are the use of functional ingredients, development of plant-based alternatives to traditional food products, implementation of zero-waste strategies, and the application of digital and smart technologies to enhance quality control and optimize production processes.

The monograph aims to present cutting-edge scientific developments, technological solutions, and practical recommendations that contribute to the advancement of food processing across a wide range of products. It represents the joint efforts of researchers, engineers, and technologists from various academic institutions and enterprises with expertise in food chemistry, biotechnology, postharvest processing, microbiology, agrotechnology, and food process engineering.

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The structure of the monograph encompasses five thematic areas:

1. Development of functional and health-oriented food products:

– technological aspects of producing gluten-free granola for the restaurant sector, aligned with modern trend of healthy eating and catering to consumers with dietary restrictions;

– evaluation of buckwheat and oats as functional ingredients capable of increasing the biological value of food products;

– development and characterization of ice cream containing vegetable oils to offer enhanced nutritional profiles;

– technological improvement of cooked sausage products with the addition of non-traditional raw materials aimed at increasing functionality and nutritional value;

– development of innovative technologies for functional alcoholic beverages based on tea-aromatic raw materials with antioxidant activity.

2. Improvement of raw materials and animal-based products:

– optimization of goose meat quality through the use of oat and alfalfa-based feed additives to enhance nutritional and sensory properties;

– use of essential oils in pig diets as a tool for improving pork quality.

3. Processing of plant-based raw materials and enhancement of ingredient properties:

– study of the chemical composition and properties of vegetable oil blends, opening new opportunities for creating products with improved sensory and functional attributes;

– evaluation of sunflower lecithin as an alternative to soy lecithin, focusing on improving the rheological, sensory, and functional properties of food;

– development and application of sea buckthorn pectin in forming the texture of food and pharmaceutical products.

4. Postharvest handling and storage of fruit and vegetable products:

– multi-criteria strategies for assessing the quality of frozen raw cherry fruits, contributing to improved storage efficiency and product shelf life;

– regulation of postharvest metabolism in fruit vegetables to minimize storage losses;

– study of changes in quality parameters of sweet peppers during low-temperature storage following freezing.

5. Rational use of food resources and zero-waste technologies:

– utilization of asparagus processing waste to fortify bakery products, serving as an example of sustainable, waste-free food processing.

This monograph establishes a solid scientific foundation for further research and contributes to the practical implementation of technologies that not only ensure

high product quality but also reduce losses, promote efficient resource use, and enhance the nutritional value of food products.

The editorial team is confident that the materials presented will be of value to a wide audience of specialists – from researchers and educators to industry professionals and decision-makers – who are engaged in the development of the food sector, implementation of sustainable and technologically advanced solutions, and improvement of public health and well-being.