

Recent Advances in Applied Microbiology and Food Sciences

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1. Introduction

Changes are taking place on many fronts, including socio-demographic changes, economic changes, and technological progress. These changes lead to both contributions and inspirations for the work of many scientists around the world. Food science deserves special attention. Newer and newer food ingredients, production methods, and technologies are being sought. Microbiological safety is an inevitable element that affects the quality of the obtained products.

With this mission in mind, the scope of this Special Issue of *Applied Sciences*, entitled “Recent Advances in Applied Microbiology and Food Sciences”, is devoted to the latest achievements in analytics and to the application of new methods and recent advanced technologies in food science and microbiology, especially modern methods of the production and testing of food as well as the sustainable development of agriculture and the food industry. In this SI, nine original research manuscripts and two review articles were collected and published. The articles included in this collection are briefly described below.

2. Microbiology and Food Biotechnology

Kot et al. [1] conducted studies with the use of selected cations and B vitamins for the biosynthesis of carotenoids by the yeast *Rhodotorula mucilaginosa* MK1. At the same time, yeast was grown on waste substrates from the agri-food industry (glycerol and potato wastewater). As a result of the conducted analyses, it was found that the presence of appropriate microelements (including barium and aluminum) in the culture medium is necessary to obtain high yields of carotenoids. Moreover, the B vitamin (niacin) stimulated the biosynthesis of torularhodin by yeast. Its content increased from 22.79% (control culture) to 33.79% (vitamin medium). It is worth noting that this is the first study to describe the effect of niacin on the biosynthesis of carotenoids by *Rhodotorula* red yeast cells.

Olea-Rodríguez et al. [2] investigated the properties and behavior of *Staphylococcus aureus*, *Salmonella* spp., *Listeria monocytogenes*, and staphylococcal toxin during the development and maturation of Cotija cheese. Cotija cheese is a semi-hard Mexican cheese that comes from a town called Cotija de la Paz in the state of Michoacan. The authors showed that during the production of this cheese there are interactions between the microorganisms that make up the complex ecosystem of the microbiota of the end product. *Staphylococcus* and *Salmonella* showed a gradual reduction in the number of bacteria due to an increase in acidity and a decrease in pH. To Summarize, it should be noted that the cheese ripening process influences if the obtained final product is safe from a microbiological point of view for the end consumer.

Isakova et al. [3] conducted research aimed at understanding the key role of mitochondria in the regulation of aging in the yeast *Endomyces magnusii*. At the same time, the authors showed that the survival of yeasts during long-term cultivation and their high metabolic activity may be related to the active function of mitochondria. Moreover, at the stage of logarithmic growth of yeast cells, the triacylglycerol (TAG) content was



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a minority in the mitochondria. In the case of diacylglycerols (DAG), their content was highest in the logarithmic phase. It is worth noting that the lipid content and composition of the mitochondrial membrane also changed significantly during the growth and aging of yeast cultures.

Ranjha et al. [4] in their review, entitled “Nutritional and Health Potential of Probiotics: A Review”, discussed selected probiotics and considered their potential health benefits. In addition, they reviewed the health-promoting role of probiotics and their mechanisms of action in the prevention of several common diseases, including reduction in obesity, minimizing diabetes (type 1 and 2), and mechanisms against gestational diabetes mellitus and chronic kidney disease.

A second review article, entitled “Antimicrobials from Medicinal Plants: An Emergent Strategy to Control Oral Biofilms”, was written by Milho et al. [5]. The authors presented the characteristics of medicinal plants and their importance in the control of oral biofilms. They also presented evidence of the effectiveness of the use of essential oils from *Cymbopogon citratus* and *Lippia alba*, which can be a great alternative to antibiotics in the treatment of oral diseases.

3. Food Sciences and Technology

Marciniak-Lukasiak et al. [6] conducted research on the use of chestnut flour and the method of packaging for the quality of gluten-free bread. The obtained breads were packed in a PA/PE barrier foil with air and under vacuum before being stored. Then, the water content, texture, and color parameters were determined, and sensory evaluation and microbiological analyses were performed. Results show that the use of chestnut flour in an amount below 10% and vacuum packaging allows one to obtain sensory-attractive bread with appropriate properties.

The study of Miedzianka et al. [7] focused on the hidden potential of plant seeds and microalgae rich in protein that can be used in food production. They investigated antioxidant and antimicrobial properties and amino acid profiles of selected spice plants and microalgae, which were also digested in vitro to determine the potential bioavailability of the polyphenols. They found that the seeds of black cumin, milk thistle, white mustard, eggfruit, and chlorella did not contain any limiting amino acids. Moreover, they suggested that fenugreek seeds appeared to be a good candidate as an attractive food ingredient due to their amino acid profile and high antioxidant activity.

A group of researchers led by Siejak [8] analyzed the impact of using various extractants (water, methanol, ethanol, and acetone) against lipid peroxidation in soybean L- α -phosphatidylcholine liposomes. Various spectroscopic and chromatographic methods were used to evaluate the effect of different extracts of *Prunus padus* on the stability of a biomembrane. Their results showed that *P. padus* is a rich source of antioxidant compounds that can effectively inhibit the degradation of the lipid membrane.

Starch is one of the most abundant biopolymers in nature. In its native form, it often does not meet the expectations of food technologists, and therefore it is subject to various modifications. One of the more interesting of these is octenyl succinic anhydride (OSA)-modified starch. Ali et al. [9] analyzed the stability of a nanoemulsion prepared using vitamin E and β -carotene co-entrapped within oil-in-water nanoemulsions of carrier oils, including tuna fish oil and medium-chain triglycerides that were stabilized by OSA-modified starch and Tween-80. The emulsion with OSA-modified starch was shown to have higher stability due to the production of denser interfacial coatings that can protect the trapped compounds from the water phase. The presented results may be useful in the design of food containing lipophilic bioactive compounds in products containing significant amounts of water.

The study of Woźniak et al. [10] focused on the extraction of galactolipids from waste by-products by supercritical fluid extraction (SFE) and ultrasound-assisted extraction (UAE). This work was focused on the application of these two green extraction technologies for the recovery of galactolipids from rosehip pomace. SFE using pure CO₂ was not an

effective method for the extraction of galactolipids such as monogalactosyldiacylglycerols (MGDGs) and digalactosyldiacylglycerols (DGDGs), although the use of an additional co-solvent such as ethanol significantly improved the separation. The use of such a low solid-liquid ratio improved the extraction efficiency. Nevertheless, about a 36% improvement in efficiency was observed after the use of sonication. SFE yields were approximately 5-fold higher than the control sample, thus proving the superiority of this technique. The results of UAE were also very promising and allow for the improvement of the extraction yield by up to 74%. The green chemistry approaches used for galactolipid isolation were compared with a conventional processing method and proved to be an interesting alternative for traditional techniques.

In turn, Hou et al. [11] presented the results of studies assessing the possibility of increasing the growth rate of plants using non-thermal plasma and reducing the accumulation of heavy metals in water spinach. The accumulation of heavy metals in water spinach depended on the type and concentration of heavy metals in the soil. It was shown that the accumulation of cadmium in spinach leaves was significantly reduced after plasma treatment of the seeds or water used for irrigation. However, no similar effect was found in the case of lead accumulation, the level of which is also important for the safety of consumed food.

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