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Editorial

Studies on the Manufacturing of Food Products Using Unconventional Raw Materials

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Today, companies blend innovation with tradition to create new products, as the food business is continually looking for fresh product ideas that reflect worldwide trends. The demand for functional foods, dietary foods, etc. as well as the depletion of conventional raw materials forces the adoption of novel raw materials in assortment diversification. Researchers are working to identify new sources of basic materials, such as those that can take the place of salt, sugar, and gluten from baked products, as well as animal proteins and lipids. For experts in the industry, the utilization of these unconventional raw materials in recipe creation presents a significant problem, both in terms of customer acceptance and applicable law.

Wang et al. [1] provided a summary of the research on the synergism of sweeteners that has been carried out so far, analyzed it, and offered comments on it. Additionally, although there has been significant progress in recent years in understanding the molecular mechanisms underlying the synergism of sweeteners, it is still hampered by a number of technological limitations. They then went over a number of hypotheses that have been put forth to explain the molecular mechanism underlying the synergism of sweeteners, particularly the interaction that results from the combination of sweeteners' effects on sweet taste receptors, and evaluated their scientific viability and shortcomings generally. Food and drink products such as candies, biscuits, and beverages have all been known to combine sweeteners. To improve the acceptability, functionality, and economics of the products, a combination of artificial intense sweeteners (such as sucralose, aspartame, and acesulfame-K) and natural bulk sweeteners (such as fructose, erythritol, and stevioside) can be used. These formulations include health and nutritional benefits in addition to reducing the amount of some sweetener components to comply with dosage restrictions (such as the current, well-liked sugar-free Coke) [1].

Another study illustrates the potential for greater capitalization of grape seeds from the seven grape types grown in Romania due to their unique qualities. Proanthocyanidins, which have an antioxidant potential 20 times higher than vitamin E and 50 times greater than vitamin C, are among the phenolic chemicals found mostly in grape seeds. Due to their antioxidant capacity, grape seeds have positive effects on cardiovascular disorders, anti-inflammatory, anti-cancer, and immune-boosting properties. They can currently play a significant role in finding new food as a source of bioactive compounds. Consumers are currently showing a lot of interest in items that are as natural as possible, which helps the body's immunity grow. Natural ingredients can be a significant alternative in the food industry [2].

Tița et al. [3] used three types of volatile oils, namely, volatile mint oil, volatile fennel oil, and volatile lavender oil to improve the quality of a kefir-type acid dairy product. In both conducted examinations, the finished product enhanced with volatile oils outperformed the control sample. Kefir samples that included volatile oils remained more sensory and texturally consistent during the duration of storage. All of these aspects demonstrated

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that the investigated items are accepted from a sensory point of view in addition to the positive effects they have on the health of the consumer. The investigated product follows current trends because it incorporates bioactive components that are advantageous for the consumer's health [3,4]. Another study sought to evaluate the antibacterial activity of volatile oils and the changes in the chemical composition of kefir enhanced with encapsulated volatile oils by enzymatic techniques. The fundamental benefit of employing encapsulation is that sodium alginate protects the volatile oils' beneficial constituents, allowing them to slowly diffuse into the kefir sample. Due to the volatile oils' antibacterial and antioxidant characteristics, products with high nutritional values were produced that are good for the consumer's health and have a longer shelf life [5].

An important source of non-conventional raw materials that can be successfully used to obtain food products is represented by secondary products resulting from various technological processes of the food industry. Spent grain is an important by-product that should be fortified to produce foods that are beneficial to health. A study used mathematical modeling and statistical optimization to provide a spelt pasta recipe that includes spent grain. Goods that have been enriched with spent grain are known as fortified foods. It is known that spent grain is a useful by-product rich in nutrients, including dietary fibers, minerals, vitamins, and lipids. A significant amount of bioactive substances with strong antioxidant properties, such as hydroxycinnamic acids, particularly ferulic and p-coumaric, are present in spent grain. According to the findings, 11.70% was the ideal determination for spelt pasta formulation that established a good balance between sensory and nutritional considerations. Products with a high fiber and protein content, antioxidant activity, and high polyphenol concentration include spelt pasta supplemented with spent grain. The achieved color of the pasta was acceptable, and the cooking losses were under 12%, which places them in the category of high-quality goods. These findings demonstrate that spent grain can be successfully included in a fortified pasta recipe to provide high-quality outcomes. Because they may enhance the products' nutritional value and have a lower glycemic index than pasta made with durum wheat white flour, spent grain flours can be employed in food compositions [6]. According to the results of another study, the inclusion of spent grain in the wafer formulation produced goods with a high level of acceptance, altered batter texture, enhanced all parameters, and only lowered adhesiveness. The samples that included spent grain had a lower pH and density. In comparison to the control sample, the fracturability of the goods with spent grain reduced as it was added, and the color darkened due to the spent grain's particular color. Adding spent grain boosts the amount of fiber and protein, antioxidant capacity, and baking loss because of the fibers it contains [7]. Another by-product, grape pomace, was used in obtaining flour by Gerardi et al. [8]. They studied the effects of time and temperature on the stability of bioactive molecules, color, and volatile compounds during the storage of grape pomace flour. They concluded that once pomace flour was stored for six months at four degrees Celsius, the activity of various health-relevant bioactive compounds remained constant, suggesting its potential use as a functional food ingredient [8].

Identification, measurement, and extraction of plant compounds with positive effects on human health that can be used in food have recently attracted increasing interest. New nutritional supplements or food products may be created as a result of the identification of these compounds. Through the application of contemporary extraction techniques, blackberries can offer even more to healthy foods and food ingredients. Anthocyanins may be found in agricultural and food processing waste from the blackberry industry. Blackberries can replace artificial food additives such as colorants and stabilizers. Blackberries are used as a traditional raw material to make jam, compote, as well as unfermented and fermented beverages. Additionally, adding blackberries increases the finished food's nutritional content and shelf life [9]. Due to the rising demand for the commercial synthesis of compounds with therapeutic properties, Crăciun and Gutt [10] established the ideal experimental settings for the extraction of trans-resveratrol in order to obtain a higher yield from the material of the vine prunings. Resveratrol has the potential to exert positive

therapeutic effects on slowing down the aging process. It also has antioxidant properties that fight free radicals, anti-aging effects on the skin by inhibiting the enzymes that cause aging, antibacterial and antifungal properties, anti-inflammatory activity, anti-carcinogenic properties, cardioprotective properties, and benefits for diabetes symptoms.

The replacement of some conventional raw materials in the manufacturing processes of some fundamental foods is another area of research. For instance, Voinea et al. investigated the effects of substituting reduced sodium sea salt for sodium chloride in a bread recipe. It is well known that the World Health Organization (WHO) advises the food sector to lower the salt (sodium chloride, NaCl) content in foods to achieve a maximum salt intake of 5 g per day for people. One of the main sources of sodium in the average person's diet is bread and other bakery products. As a result, the majority of initiatives to cut back on sodium consumption concentrate on lowering the amount of sodium chloride in these items. With the increased level of sea salt with low sodium content added in wheat flour, the bakery goods produced with sea salt with low sodium content were of greater quality compared to the control sample, displaying better physical and textural qualities, a darker color, and being more well-liked by consumers [11]. Ziarno et al. [12] investigated the link between spreadability and other specified structural, physicochemical, and chemical factors by analyzing market samples of butter and butter replacements in terms of spreadability. The study's findings can be used to create new and enhanced butter and butter replacements that have comparable features for spreading without compromising other crucial qualities such as flavor, texture, and nutritional value. Since these fats vary not only in their calorific value and hence in their chemical composition, but also in their functional features, such as spreadability, it might be challenging for certain consumers to choose which fat to use in spreads.

Recent years have seen an increase in research towards the production of food items using previously ignored or underutilized basic materials. One of these is hemp, which is often processed for the textile industry due to its high fiber content, but in recent years, it has emerged as a novel raw material in food. Baldino et al. [13] researched the prospect of increasing the yield of oil extraction from seeds and enhancing the waste was examined using stable oil-in-water emulsions based on hemp oil and commercial hemp protein isolates. The created emulsion is stable, which can promote process development and the use of hemp seed extraction waste for the valorization of by-products and waste in order to produce complete food products with high nutritional content. For those with unique dietary demands, the product can alternatively be utilized as a foundation to obtain slightly structured products. Another study showed that adding hemp inflorescence to rice-based gluten-free bread can be beneficial. Significant alterations in the physical characteristics of the bread were brought on by the addition, which was utilized at concentrations between 1% and 4%. The bread's volume and the color of the crumb both considerably changed after 1% of the additive was added. Because hemp inflorescence has never been utilized to make bread and is a good raw material for health reasons, this study suggested using it to make gluten-free bread [14]. Ciocan et al. [15] suggested that the physicochemical and sensory characteristics of samples of wort and beer be evaluated in relation to the use of unmalted and malted buckwheat. Buckwheat is one of the pseudocereals that is most frequently used as a raw material in studies on the production of malts, gluten-free beers, and functional beers because it consistently produces excellent results in terms of productivity, enzymatic activity, and chemical composition of the finished product. The results obtained suggest that, in future studies, beer should only be made from unmalted buckwheat with enzyme addition, which is far more advantageous from an economic and technological aspect. This is due to the fact that by just adding enzyme preparations to the brewing process, buckwheat can be used to make beer without first being malted [15].

In relation to some of the chosen wort characteristics, Rydzak et al. [16] investigated the impact of vacuum impregnation on the steeping process and the modifications to the structure of barley grains. It can reduce the time it takes to moisten barley grain to 42% moisture content by around 6 h by vacuum-impregnating it under varied conditions.

The biggest benefit of vacuum impregnation in the malting of grain is that it makes it possible to drastically shorten the malt production cycle, which is now prolonged by the need to soak the grain before malting [16].

All of these studies have one thing in common: they all focus on finding new raw materials that can be used in food manufacturing recipes. These raw materials have been studied from a physico-chemical, sensory, and food safety perspective.

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