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Editorial

Food By-Products a Promising Source of Bioactive Compounds Useful for Food and Nutraceutical Industries

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Energy production, availability of well-balanced food, and biochemical waste minimization are some of the major concerns worldwide. Food by-products are produced in large amount in the food industries, annually around the world. About 38% of food wastes is produced during food processing [1]. Vegetable-derived processing food wastes include stems, seeds, peel, shells, bran, trimmings residues [2]. The disposal of these food industry wastes in the environment lies on the ecosystem. Proper waste management plays a pivotal role in the growth of food industries [3]. Generally, agro-industrial wastes have been extensively used as animal feeds, fertilizers or as biofuels [4]. Food by-products however represent a promising source of bioactive compounds, which may be re-utilized for their potential healthy and rheological properties. Food industries are trying to embrace the circular economy approach by utilizing both the products and the by-products they obtain in the production chain. Recently, several researches led to the identification of bioactive compounds useful for formulation of functional food or nutraceutical products from food-by products. Increased health awareness along with environmental consciousness has further augmented the scientific interest in this area. In fact, this new perspective turns the problem of food by-product management into an opportunity. Peels, seeds, shanks, leaves, wastewater, and unusable pulp represent more than 40% of total plant food [5]. These by-products, are very rich in nutrients such as sugar, minerals, organic acids, dietary fibers, polyphenols, carotenoids that could therefore be reused and have their own market [6], assuming a relevant economic and scientific value in various industrial sectors [7]. On this perspective in the production of pomegranate juice, peel and pericarp, rich in cyanidin-3,5-diglucoside, cyanidin-3-diglucoside and delphinidin-3,5-diglucoside could be reused as anthocyanin nutraceuticals products [8]. As well as pomegranate seed. Lucci et al. [9] evidenced that pomegranate "Dente di Cavallo" seed extract rich in punicic acid, α-linoleic and α -linolenic acids exert a promising antioxidant and antiproliferative activity and represent a value-added ingredient in formulations of products aimed to prevent cancer. In the fruit and vegetable sector broccoli leaves and stalks, and tomato peel are examples of by-products to be re-evaluated for the presence of glucosinolates, phenolic acids, flavonoids, lycopene, tocopherols, sitosterols [10,11]. Peach and apricot by-product including peel and kernel are both rich in dietary fiber, phenols, carotenoids and peptides [12,13]. It has been estimated that olive oil processing produces 25kg of by-products per tree per year. Leaves represent 5% of the weight of olives in oil extraction. At the same time, the olive oil processing produces 35kg of solid waste (cake) and 100L of liquid waste (oil mill wastewaters) per 100kg of olives. Oleuropein, and other bioactive secoiridoids could be isolated by olive leaves and olive-processing by-products [14]. Up to 30%, w/w of the grapes processed by wine industry generates a solid waste (stems, skins, and seeds). Grape seed are rich in catechins while skins are rich in resveratrol, quercetin and its derivatives. Proanthocyanidins could be obtained from grape stems [15]. Dietary fiber could be recovered by cereal processing [16]. Even though the re-utilization of food by-products is a topic of great interest and largely discussed by scientific community, several point should be still investigated in order to obtain better recovery performance maybe using innovative technologies such as ultrasound assisted extraction, enzymatic assisted extraction, microwave extraction etc. Furthermore, it will be necessary to evaluate whether by modifying the production process (e.g. reduction of temperatures and processing pressures) without influencing food quality it is possible to further preserve the bioactive molecules present in the waste to further increase the recovery of these compounds for application in feed, food, packaging and nutraceutical industries with the purpose to boost profits and reduce costs related to waste disposal.

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