Super Foods Nutritional/Health Benefits

Subjects: Nutrition & Dietetics
Contributor: Gulzar Nayik

The advancement within the food and nutrition sector has resulted in the development of a special category of food, particularly referred to as “superfoods”. Superfoods are special kind of foods capable of exhibiting different positive effects involving prevention of different ailments, provide impetus to the immune system, and essential macro- and micro-nutrients in ample quantities. Nowadays, these are gaining considerable attention due to the increased health consciousness of consumers. In contrast to their exceptional health or even medicinal benefits, which are based on their long history of use, the concept of superfoods is still little understood. The category of superfoods mainly comprises different types of fruits, vegetables, grains, etc.

Keywords: superfoods ; immune system ; fruits ; nutrients ; health benefits ; micro-nutrients ; macro-nutrients

1. Introduction

Over the last few years, in parallel with the increasing number of studies which provide evidence that food and its components have a potential impact on human health, consumer perception about food has extensively changed. Apart from satisfying the essential needs, by fulfilling hunger and giving nutrition, an ever-increasing number of consumers believed that food has the potential to enhance their health and well-being through counteraction of nutrition-related illness and enhancement of mental and physical conditions. This idea has a notable and long-lasting history, legitimized by Hippocrates’s articulation, ‘let food be thy medicine and medicine be thy food’. Foods which may improve the overall states of the body, reduce the occurrence of certain sicknesses, and may be utilized for treating a number of diseases, are known as ‘functional foods’. The utilization of this term was first recorded thirty years ago in Japan and now it has been acknowledged all over the globe. Apart from reducing the cost of different healthcare activities of aging people, functional foods have a commercial capability in food-related industries. Nowadays, ‘superfoods’ is the most common term utilized for functional foods [1]. These have been a source of interest within the last few years among the population of Western countries. Superfoods are considered to be a rich source for different types of macro- and micro-nutrients. The Oxford English Dictionary characterizes superfood as food that is “considered particularly nutritious or in any case helpful to human wellbeing and prosperity” [2].

The utilization of the term “superfoods” was originally for functional foods. It is considered to be an umbrella term for the description of foods that, in addition to their typical nutritional content, offer health benefits and/or properties of disease prevention [3]. On the other hand, “superfoods” can refer to some traditional foodstuffs that have been enhanced with improved functional characteristics by different processing methods, rather than modification of genes [4]. Superfoods, while similar to functional food in offering health-promoting benefits in addition to just providing nutrients, vary in some aspects. These can be defined as functional foods which are processed minimally and occur in nature, possessing the distinguishing feature of being “traditionally utilized”. Superfoods have the trait of being used in limited culinary and therapeutic contexts, typically in far-flung locations. As a result, these are gaining attention not only for their extraordinary and naturally beneficial health advantage, but also for their shared characteristics of belonging to an authentic, isolated, or exotic community [5]. It has also been suggested that superfoods can be classed as both food and medicinal plants, on the basis of containing “a plethora of synergistic components” [6].

The utilization of the term “superfood” is frequently observed in the scientific press. It is a term used in academia in the description of food that is both attractive and high in energy [7]. The section of vegetables and fruit in supermarkets can be considered by far possibly the best definition of a superfood. Here, the term superfood refers to a food that is particularly high in phytochemicals. The notion is that by identifying a few foods that are particularly strong in antioxidants, micro-nutrients, or other types of plant bioactive components, their intake in the diet may be increased [3]. According to a recent investigation, a Google search for superfoods generally yielded as many as 57 results in the first 15 web pages [8]. However, rather than in scientific findings, the term was more likely to show up in marketing, on product packaging, the function of innovative and alternative food components, products targeting the wellbeing of consumers, and the media [9].

According to the results obtained in August 2018, the term “superfoods” yielded 191 results from a search, including research articles, book chapters, and review articles, whereas the term “superfruits” yielded 85 results on the database of Science direct, and the “functional foods” term yielded 210,226 results on Wiley and 382,852 results on Science direct databases in 1998–2017, respectively. As a result, it is conceivable to assert that the scholarly convention of the term “superfood” differs from that of the term “functional food” [5].

Superfoods, or more precisely superfruits, are typically comprised of exotic fruits that are not well-known across the world. A broad range of different health benefits are considered to be claimed by many superfoods including the effective activity of anti-oxidants; the presence of an extraordinary amount of bioactive components such as anthocyanins, flavonoids, phenolics, etc.; and/or potential impact on disorders such as cardiovascular diseases, diabetes mellitus, etc., typically through effecting specific markers such as blood pressure, body mass index, or waist circumference, and fasting concentrations of glucose, plasma triacylglycerol, etc. [8].

In this review, we will systematically discuss different “superfoods” including Brazil nuts, hempseed, garden cress, maca, amla, camel milk, jackfruit, and goji berry along with their macro- and micro-nutrient profile and their potential benefits for human health.

2. Brazil Nuts

Brazil nuts are considered to be one of the most frequently consumed nuts, typically found in South America, and are procured from the huge Brazil nut tree, scientifically known as *Bertholletia excelsa*. Well-drained and found in hard soils along the Amazon River, which are the most suitable soils for the growth of the Brazil nut tree, these are generally found in different countries such as Venezuela, Colombia, Ecuador, Peru, and Brazil. The diameter of Brazil nuts is around 6 cm, round in shape, and consist of a hard-shell having thickness of 0.5 cm. The fruit is generally pear-shaped or large round in nature, consisting of a woody and thick outer skin. Approximately 12 to 24 three-sided angular nuts are contained in each fruit. The individual unit of nut consists of a triangular and stretched shape, light cream color, and is irregularly cylindrical in nature. Seed capsules are thick-walled and woody, having about large grapefruit size and weighing about 2 kg [10].

The Brazil nut is considered to be economically important. The collection is done during the rainy season by small communities in indigenous regions and then it is shipped to the plants of processing, going through a treatment that includes the accompanying stages such as sorting and grading, drying, breaking down, and size sorting. The initial step is of extreme significance of sorting by visual/manual means to eliminate mold infected and stained nuts, preceding by size grouping. The end product is exposed to hot sealing and vacuum packaging at the termination of the cooling and drying processes [11]. Due to the presence of protein, lipid, and minerals with antioxidant properties such as selenium, the Brazil nut kernels can play a major role in food research. Hence, considering this aspect, industries are devotedly working to obtain oil by a hydraulic press, as its waste is infrequently used. International recognition of Brazil nuts is due to their caloric and nutritional fullness, which has resulted in various studies which focus on the isolation of their main functional and nutritional components. The fraction of lipid present in this fruit is one of the chief interests for industries, due to its more economic and profitable isolation. Brazil nuts are considered as one of the food items which (i) bring enhancement in future commercial applications, (ii) prompt a decent expense, and (iii) advantage proportion and excessive progress in the field of experimentation [10][12].

2.1. Nutritional Composition of Brazil Nuts

2.1.1. Macro-Nutrients

The macro-nutrients such as water, total lipid, protein, and carbohydrate composition of Brazil nuts are 3.5%, 66.4%, 14.3%, and 12.3%, respectively. Considering the diverse aspects of fatty acid, Brazil nuts contain approximately values of 25%, 21%, and 15% of monounsaturated fatty acids (MUFAs), polyunsaturated fatty acids (PUFA), and saturated fatty acids (SFA). Nuts are considered to be the greatest source of unsaturated fatty acids involving PUFA and MUFA. Except for coconuts, Brazil nuts contain the highest amount of saturated fat content among all the nuts, superior to macadamia nuts. Omega-3 fatty acid also known as α-linolenic acid is present in abundant amounts in Brazil nuts, constituting almost 7% of the whole fats. Of the remaining fats, the most plentiful is monounsaturated fat (predominantly oleic), followed by saturated fat (palmitic and stearic), and polyunsaturated fat (linoleic, omega-6) [13][14].

2.1.2. Micro-Nutrients

Trace elements are present in high amounts in Brazil nuts, considered to be an essential aspect of the diet. Elements such as Cr, Cu, Fe, etc., are the existing elements that act as co-factors for the effective function of many metabolic and physiological aspects. Overall, the sequence Mg > Ca > Fe > Cu > Cr > As > Se pattern is generally the potential order of element level in typical nuts, including the Brazil nuts. Brazil nuts are viewed as a rich source of Se, although there is a great variation in the amount of Se among different species of Brazil nuts [15]. Compared to selenium levels of cashew nuts, walnuts, and pecans, Brazil nuts exhibited the highest amounts [16]. These are considered to be the greatest known food source of selenium, providing about 160% of the United States Recommended Dietary Allowances (US RDA) for Se [10]. Protein content containing S-containing amino acids are present in abundant amounts in Brazil nuts, resulting in the boosting of absorption of Se and other minerals [17][18]. The bound form of phenolics is present in a good amount in nuts, i.e., 123.1 ± 18.4 mg/100 g [10]. Tocopherols are present in a decent amount in Brazil nuts, including α-tocopherol, β-tocopherol, and δ-tocopherol as 5.73 ± 1.54 mg, 7.87 ± 2.15 mg, and 0.77 ± 0.66 mg per 100 g of Brazil nuts [13][14]. β-Sitosterol, stigmasterol, and campesterol exhibit 95% of absolute phytosterols, required in the diet. A decent amount of phytosterols, involving campesterol (26.9 ± 4.4 µg/g oil), β-Sitosterol (1325.4 ± 68.1 µg/g oil), and stigmasterol (577.5 ± 34.3 µg/g oil) is present in Brazil nuts. The highest squalene content (1377.8 ± 8.4 µg/g oil) has been reported in Brazil nuts [10].

2.2. Health Benefits of Brazil Nuts

Beneficial effects, exhibited by various scientific research of regular consumption of Brazil nuts, suggest that the sources of functional and nutritional compounds are due to the presence of its micro- and macro-nutrients (**Table 1**). In this case, due to the presence of considerable amounts of amino acids, proteins, and selenium, an affinity bonding has been formed between these components, establishing an organic complex of greater bioavailability [10][15]. An increased content of plasma selenium was observed during ingestion of Brazil nuts, but it had negligible activity on high-density lipoprotein, lipids, apolipoproteins functionality in humans [19]. A single intake of Brazil nuts by healthy volunteers resulted in an indication of a prolonged decrease in inflammatory markers [20]. According to the literature, consumption of 1.5 ounces of common nuts as a component of the diet routine (majorly Brazil nuts) per day may aid in the decrease of the danger of heart-related illness [21]. Selenium found in Brazil nuts exhibits numerous health benefits. Selenium is considered to be a crucial trace mineral. For the proper functioning of the thyroid gland and immune system, an adequate amount of Se is essential. Selenium is considered to be a vital constituent of antioxidant enzymes. Due to its effective action as a naturally occurring anti-carcinogenic agent, Se is receiving considerable attention. High Se levels have exhibited a positive beneficial effect on the prevention of cancer when tested on various animal studies [22].

Different studies performed on the anti-proliferative action in cell cultures for diverse nuts showed the inhibition and destruction of Caco-2 human colon and HepG2 human liver cancer cell proliferation when exposed to soluble nut extracts in a dose-dependent manner. Nuts exhibit an effective ability for inhibition of proliferation of Caco-2 cell compared to the proliferation of HepG2 cell. Total phenolic content of Brazil nuts can partially explain the decrease of the proliferation of cancer cells by extracts of nuts, suggesting that anti-proliferative activities were possible due to the occurrence of a class of phenolics or specific phenolic compounds in nuts [23].

3. Hempseed

Hemp, scientifically known as (*Cannabis sativa* L.), belongs to the Cannabinaceae family. It is an herbaceous plant having annual growth and has been considered a vital source of medicine, fiber, food, and a religious/psychoactive drug [24]. Hemp has its origin in Asia and has been cultivated and grown for about 10,000 years [25]. *Cannabis sativa* L. usage has been considered to be controversial from a historical period. Non-drug type (hemp) and drug type (marijuana) are further classifications of *Cannabis sativa*. The former is generally crucial for food and fiber industries, while the latter is functional for recreational and medicinal purposes. During the time of the late nineteenth century and mid-twentieth century, hemp cultivation was at its peak due to the utilization of raw materials for oil drying in the painting industry, fuel, and textile clothing. Interest in hempseed as a source of food grew since this tiny plant entity was an abundant but unexploited source of nutrients when consumed daily in raw form or the form of other products originating from the raw material (i.e., bakery products and oil) and can assist in enhancing the functional and nutritional support of human beings [26]. ‘Hempseed’ is a term used for the seeds procured from industrial hemp, whereas oil extracted from hempseed is known as hempseed oil (can be also referred to as fixed vegetable oil) [27]. Hemp seeds are considered to be a rich source of oil containing approximately 33–35% oil [26]. Food products derived from hempseeds are considered to exhibit a specialty market involving specialty food and natural outlet of food, and due to their exceptional nutritional and taste aspects, these are becoming more prevalent in the Western diet [28].

3.1. Nutritional Composition of Hempseed

3.1.1. Macro-Nutrients

Hempseed contains rich amounts of oil, protein, carbohydrate, fiber, and moisture, with values ranging approximately from 25% to 30%, 25% to 30%, 20% to 30%, 30% to 40%, and 6% to 7%. A considerably large number of unsaturated fatty acids (>90%) is present in hempseed involving the necessary stability of ω-6/ω-3 fatty acid [29]. Fatty acid composition (containing ω-3 and ω-6 classes), in hempseed and its oil, comprise some vital constituents which are essential for various physiological functions, including leukotrienes and prostaglandins synthesis, skin integrity, and sustainment of cell membrane structure. The oils derived from plants contain a large amount of these unsaturated fatty acids; however, linoleic acid (LA) and, analogously, α-linolenic acid (ALA), is the most prevalent fatty acid in hempseeds, summing up to 80–90 g/100 g of their absolute fatty acid content. Among the fatty acid present in hempseed, LA and, analogously, ALA are predominantly present, ranging between 80–90 g/100 g of the whole fatty acids [30]. Removal of crunchy outer shells results in the decrease of carbohydrate fractions ranging from 25% (of seed) to 10%. There is no object of interest identified in the literature data about carbohydrates, despite the identification of different cyclitols, monosaccharides, and disaccharides as sugar elements of *Cannabis* species [31].

Hempseed protein, due to its high nutritional value, has increasingly gained attention in scientific studies and research, resulting in an increased quantity of scientific publications under the term “hemp protein”, generally present in keywords, abstract, and title of publications [32]. Hempseed protein consists of over of 181 proteins, involving classification into two major protein groups: globular-associated albumin (25% to 37%) and legumin-associated globulin edestin (67% to 75%) [33]. The dietary prerequisite of humans is not for protein, but for a specific amount of essential or indispensable amino acids. Hemp protein contains a balanced profile of amino acids involving all the major fundamental amino acids. These are practically identical to other great quality proteins (e.g., soy and casein protein) and fulfill the sufficient requirement of protein for two to five year old children given by the WHO (World Health Organization)/FAO (Food and Agriculture Organization) [32][34]. A rich amount of glutamine and arginine is present in hemp protein [35]. When compared to arginine (less than 7%) of other food protein (e.g., rapeseed, soy, whey, egg white), it represents around 12% of the total protein of hempseed [26].

3.1.2. Micro-Nutrients

The concentration of anti-nutritional compounds (condensed tannins, phytic acid, trypsin inhibitors) was reported to be very low in hempseeds [36]. Total phenolic content (TPC) generally varies in hempseeds and it is considered to be the highest in the hull than the kernel [37]. TPC content using Fedora cultivar in another study was found to be 767 ± 41 mg gallic acid equivalent (GAE)/kg in whole seed and 21 ± 5 mg GAE/kg in oil, respectively [38]. A distinctive phenolic profile was reported in the coarse hull and fine cotyledon segment of hempseed, where the synapic acid, cannabisin B, ferulic acid, and N-transferuloyltyramine were concentrated in hull fraction, and the p-hydroxybenzoic acid, gallic acid, and catechin were present in cotyledon fraction [39]. Calcium was found to be in a significantly high amount (944.41 mg kg^{-1}) in seeds. The highest amount of minerals in hemp seeds was reported for iron followed by zinc, manganese, and copper, while molybdenum, nickel, and cobalt were found to be in minor quantities. The normal quantity of Cu in the whole hemp seeds ranged between 7 and 13 mg kg^{-1} [38]. Tocopherols are present in abundant quantities in hempseed, among which γ-tocopherol has a value of 28.23 mg/100 g of oil in hempseed [40].

Apart from the presence of γ-tocopherol, other tocopherols are α-, δ-, and β-tocopherol. Phenylpropanoid amides are the component of polyphenol, discovered to be best described in cannabis fruits, additionally named as hydroxycinnamic acids amides (HAA) or phenyl amides, and their derivatives. Among the presence of expansive extent of HAA in plants, products of primary conjugation among aryl monoamines like octopamine and tyramine and C6C3 phenolic acids were found in hempseed. Coumaroyl amino butanol glucopyranoside was the trivial name appointed to a novel compound obtained from hemp seed, which emerges from the biosynthesis of amide among 4-aminobutanol and coumaric acid. Polyamine’s catabolism occurring between the two distinct groups of oxidases namely polyamine oxidases and diamine oxidases results in the production of the above compound (coumaroyl amino butanol glucopyranoside) which is considered to be an end product. This compound helps in establishing a framework for research on hemp seed and fundamentally adding incentive in neuroprotection through exhibiting critical prevention effects on TNF-a release from LPS-induced BV2 microglial cells [41].

3.2. Health Benefits of Hempseed

Enzyme accessibility is important for consideration of the extent of digestion of dietary proteins, which is influenced by the structure of the molecule as well as other segments connected with proteins. Depending on the sources, 90.8% to 97.5% was the range of the protein digestibility of dehulled hempseed, which is almost comparable to casein (97.6%) [42]. A considerably low amount of allergens are present in hempseeds. During the hemp protein isolate (HPI) process, all the major allergens, namely nonspecific lipid transfer protein (LTP) and thaumatin-like protein, were almost eradicated and after gastrointestinal digestion, the presence of none of the protein fragments was observed. Even though there are exceptionally low reports on immunological response to hempseed protein, the presence of allergen-analogous proteins (for instance, serpins) in HPI and their peptide parts warrants, which are digestion-resistant encourage investigation to set up the potential impact on health [43]. Exhibition (in vivo and in vitro) of a varied range of bioactivities involving antihypertensive, antioxidant, antithrombotic, antimicrobial, cytomodulatory, hypocholesterolemic, immunomodulatory, and mineral binding properties were observed during the hydrolytic conversion of protein to peptides from both the sources, i.e., plants and animals. Disruption of definite active sites of the disease-associated metabolic enzymes can occur through enzymatic digestion of proteins, as these assist in separating long chains of polypeptides into short portions that fit in. The possibility of peptides binding to nonactive sites on the target enzyme causing disease can occur through electrostatic or hydrophobic collaborations. Feasibility and potential in manufacturing the bioactive peptides have helped in a flourishing research on hemp protein during the past decade. Inhibition of angiotensin I-converting enzyme, acetylcholinesterase (AChE), rennin, along with antioxidant activity, metal-binding capacity, serum glucose regulation, and hypocholesterolemic effect were some of the health-promoting activities exhibited [32].

4. Garden Cress Seeds

Garden cress, scientifically known as (*Lepidium sativum* L.), is considered to be an annual quick growing herb, local to the west region of Asia and Egypt. It is known to be cultivated all over the world. “Chandrasur” is the name given in the local language to garden cress (GC) and it is considered to be a source of vital medicinal crop in India [44]. Growing in any type of soil and climatic conditions, the ability to bear slight acidity is the main characteristic possessed by *Lepidium sativum*. It is considered an annual plant with a stature running around 50 cm that can be cultivated without having superior technical knowledge, using less equipment and facilities, irrigation, and in comparatively weak soil [45]. The garden cress seeds dicotyledonous endosperm accounts for 80–85%, seed coat (12–17%), and embryo (2–3%) of the seed matter respectively. It morphologically resembles some of the oilseeds. The seeds possess cream to brick red colored seed coat and yellow-colored endosperm [46]. Garden cress seeds are loaded with varied types of nutrients, which assist in combating anemia, malnutrition, and other micronutrient related deficiencies. It has not been consistently utilized in Indian homes due to the lack of awareness of the people, and it is considered to be an underutilized, uncommon crop. Garden cress seeds in India are usually consumed in either processed (soaked, boiled, and roasted) or raw forms. The distinctive processing operations involved are generally helping in the improvement of its acceptability as well as its shelf life [47].

4.1. Nutritional Composition of Garden Cress Seeds

4.1.1. Macro-Nutrients

The major macro-nutrients involved in garden cress seeds comprise carbohydrate, protein, lipids, and crude fiber constituting 33 to 54%, 22 to 25%, 14 to 27%, and 8%, respectively. It is a rich source of calories (454 kcal/100 g) [46]. Approximately 23.40% of fat content was found in raw garden cress seeds, making it a rich source of fat [47]. A good amount of essential fatty acids is present involving linoleic acid, arachidic, and alpha-linolenic acid, constituting 8.5–11.5%, 2–3.5%, and 34%, respectively, acting as memory boosters [48]. The oleic (22.90%), linoleic (11.40%), linolenic acid (27.30%), and palmitic acid (10.00%) are the chief fatty acids found in oil obtained from garden cress. The minor fatty acids found in oil extracted from garden cress seeds were nervonic (5.40%), arachidic (3.20%), stearic (3.20%), and eicosenoic (3.30%) acids [47]. The most abundant saturated fatty acid in seeds was found to be palmitic acid (10.3 ± 0.12 g/100 g) and the least abundant was palmitoleic acid (0.70 ± 0.30 g/100 g) [44].

4.1.2. Micro-Nutrients

Garden cress seeds (GCS) have the ability to provide essential micro-nutrients necessary for sustaining the health of humans and other animals [44]. GCS are packed with various types of vitamins mainly including riboflavin (0.61 mg/100 g), thiamine (0.59 mg/100 g), and niacin (14.3 mg/100 g) [46]. The mineral quantities of seeds differed between species, yet potassium is considered to be the most significant mineral in GCS (1236.51 mg/100 g), followed by calcium, phosphorus, and magnesium, while zinc and manganese constitute the lowest values [44]. *Lepidium sativum* contains a moderate amount of phytosterols mainly campesterol, sitosterol, and avenasterol. Apart from phytosterols, the plant is known to contain semilepidinoside A and B, β-carotenes, imidazole, sinapic acid lepidine, and sinapin [47]. GCS oil contains a good quantity of tocopherols, having total tocopherol contents (139.73 ± 0.91 mg/100 g). The most abundant tocopherol found in seed oil is δ-tocopherol. Maximum DPPH (2,2-diphenyl-1-picrylhydrazyl) inhibition was the most vital activity performed by garden cress seeds during the DPPH radical scavenging assay at amounts of 100, 150, and 200 µg of extracts of methanol [44].

4.2. Health Benefits of Garden Cress Seeds

The different phenolic compounds present are mainly responsible for various antioxidant properties in GCS. Tocopherols are the major phenolic compound found in GCS extract. These assist in the prevention of various diseases and are considered a vital nutritional function in humans as a source of vitamin E. Fats and oil stabilization is the major function of tocopherols present in GCS to prevent oxidative deterioration, having numerous applications in biomedical, pharmaceutical, and dietary products. Development of a balanced diet through fortification of GCS, as it has the high free radical scavenging potential, can help in exploiting and incorporating its possible medicinal and nutritional values in developed food. Due to the presence of linoleic and arachidic acids, GCS are considered to be an effective form of memory boosters. Regular consumption of GCS aids in increasing the lean body mass due to the presence of a decent amount of protein and iron. The soaking of GCS lime water aids in increasing the absorbability of iron, ultimately helping in the strengthening of hair. The leaves are mild diuretics and stimulants and are valuable in ameliorating liver complaints and scorbutic (analogous to scurvy) diseases [44]. GCS seed powder contains a rich amount of iron (100 mg/100 g), which aids in the prevention of gentle anemic conditions, occurring particularly in children. GCS assists in the proper contraction of muscle required for healthy activities of the heart and limbs due to the presence of a decent amount of calcium and magnesium having values (377 mg/100 g) and (430 mg/100 g). Phosphorus (723 mg/100 g) present is indispensable for supporting proper activities of healthy metabolic system in the body. Ultimately, it can be said that garden cress is the powerhouse of vitamins, minerals, and other micro-nutrients that have the potential to combat anemia, malnutrition, and other micro-nutrient deficiencies [48].

5. Maca

Maca root is considered to be one of the oldest foods belongs to the Brassicaceae family and is known to have been cultivated for about 2000 years. It can grow in high altitude regions involving intense sunlight, rock formations, egregious weather, and windy conditions, inappropriate for the sustainability of numerous other species [49]. Maca has the capability of sustaining at high altitudes ranging between 2800 and 5000 m above sea level. The major producer of good quality maca is Peru. Netherlands, USA, UK, Canada, China, Germany, and Japan are the chief consumer countries of maca based products [50]. Sensorial properties of maca generally include an exceptional aroma and flavor analogous to caramel, attracting the indigenous population for its consumption [51]. Hypocotyls and chief tap root are considered to be the edible part of maca. Other edible sources of maca include stem, leaf, and inflorescence of maca (labeled as aerial parts), which are generally underutilized in nature [52]. The major nutritional constituents involved in maca roots are starch, protein, and dietary fiber and the leaves are a rich source of dietary fibers, essential amino acids, vitamins, and minerals (**Table 1**). The chief dietary constituents in maca is believed to exhibit different biological benefits [50]. Due to various health claims and benefits exhibited, food products derived from maca have become popular in the niche food section market, specifically involving health-conscious consumers. A wide range of commercial products obtained from maca mainly includes flour (milled and dried), maca root capsules or pills, encapsulated or plain hydroalcoholic extracts, gelatinized flour (dried, milled and extruded), liquor, mayonnaise, tonic drinks, and chocolate [53][54].

5.1. Nutritional Composition of Maca

5.1.1. Macro-Nutrients

Water content present in fresh maca root is over 80%. It is considered to be a nutrient-dense and low energy food [55]. The most abundant macro-nutrient present in maca is carbohydrates and starch, having values of ~46–74% and ~37–77%. The starch content of maca root exhibits similar values to that of sweet potato root. The storage period at room temperature (~22 °C) of total starch contents present in maca root is believed to be 21 days [50]. Maca starch exhibits higher retrogradation and gelation, water-solubility, lower resistance towards shearing, swelling, and pasting viscosity, when compared to maize, potato, and cassava starch [56]. Dietary fibers are present in abundant quantity in maca and its byproducts. Maca root contains total dietary fiber (15.6 to 26.0%), insoluble dietary fibers (14.8 to 23.4%), and soluble dietary fiber (2.6 to 7.9%) (dry weight), respectively. A good amount of protein (875 to 1255 mg/g protein of total amino acids) was reported in maca roots and the ratio of vital amino acids to entire amino acids was found to be between 0.21 and 0.28. The content of total essential and non-essential amino acids was found to be 189 to 313 and 634 to 942 mg/g protein, respectively. Total essential amino acids having values of 189 to 313 mg/g protein were reported in maca root majorly involving methionine, valine, threonine, leucine, isoleucine, phenylalanine, and lysine. The respective values ranged between 6–57, 37–81, 24–43, 35–51, 24–42, 24–39, and 36–61 mg/g protein. The non-essential amino acid value was reported to be 634 to 942 mg/g protein, chiefly involving glutamate, aspartate, histidine, serine, alanine, proline glycine, tyrosine arginine, and cysteine in the range of 61–123, 54–91, 15–34, 17–25, 28–41, 287–423, 31–44, 15–21, 76–238, and 1–3 mg/g protein, respectively [57]. Minor amounts of lipids were found in maca roots ranging between 0.59 and 2.2%. A higher value of unsaturated fatty acids (52.7%) was reported in maca roots when compared to saturated fatty acids (40.1%). Considering the category of saturated fatty acids, palmitic acid predominates the list followed by stearic acid having values of 23.8% and 6.7%, respectively [50].

5.1.2. Micro-Nutrients

Maca roots are considered to be a rich source of minerals. The chief abundant mineral on dry basis was found to be potassium (5394–8063 mg/kg) in maca root, followed by calcium (3839–4502 mg/kg), magnesium (625–837 mg/kg), sodium (138–188 mg/kg), iron (58–550 mg/kg), zinc (23–31 mg/kg), manganese (10–17 mg/kg), and copper (4–8 mg/kg) [57]. A varied number of minor bioactive compounds (total of 160) considered to be secondary metabolites were extracted and identified in the methanolic extract of maca root. Maca root is an abundant source of various compounds including, β-carboline alkaloids, organic acids, glucosinolates, common amide alkaloids, macamides, and imidazole alkaloids [58]. Depending upon the color types and cultivation zone, the total value of alkaloids was found to be in the range of 0.20 to 2.99 mg/g dry weight in maca roots. Macaridines, macamides, imidazole alkaloids, β-carboline alkaloids, and common amide alkaloids are the five chief alkaloids present in maca [57][58]. During the analysis of 17 maca samples, 11 compounds were determined, and in particular 5-Oxo-6E 8E-octadecadienoic acid was found to be the most plentiful compound [50]. Fourteen volatile compounds were identified in maca roots using isolation methods, namely thermal-desorption cryo-trapping-gas chromatography-mass spectrometry (TCT-GC/MS). Among them, the chief compounds obtained were isothiocyanates, chloro-compounds, and tetrahydro-3-methylfuran having values of 27.26%, 20%, and 14%, respectively [59].

5.2. Health Benefits of Maca

Maca has been traditionally consumed for its effects in enhancing human reproduction health, mainly involving improvement of fertility, spermatogenesis, and sexual libido [60][61] (**Table 1**). Maca is considered to be one of the customary home-grown medications in the areas of highlands of Peruvian. Recognizably, customary herbal medication suggests a mix of herbal and diet therapies as well as spirit and mind in the counteraction and treatment of disease [62]. Experimental evaluation of forced swimming test on mice model (ICR mice (female) and Kunming mice (male), regarding the antifatigue activity of maca, showed the positive outcome of prolonged swimming period (for a span of 30 days), resulting in reduced blood lactic acid and enhancement of liver glycogen content when powder of maca root (at a dose of 400 mg/kg bw/d for 30 days) was consumed. Another experimental study evaluation suggested that consumption of maca polysaccharide at an actual dose of 100 mg/kg for a time of 30 days can aid in enhancing the acceleration of swimming velocity and increasing the swimming period of both female and male ICR mice [63][64][65][66]. Macamides (benzylated amides), alkaloids, N-3-methoxybenzyl-linoleamide, benzyl isothiocyanates, polyunsaturated oxoacids (macaenes), and polyphenols are the possible neuroprotective compounds present in maca. For instance, quercetin and anthocyanins (polyphenols), present in dark maca, assist in improving the rat's cognitive performance. The effective mechanism involved in the neuroprotective activity of different maca samples was due to the inhibition of fatty acid amide hydrolase (FAAH), butyrylcholinesterase (BuChE), acetylcholinesterase (AChE), and modulation of the antiapoptotic or antioxidative effects and releasing of neurotransmitters [50]. Flavonoids present in maca roots are considered to be the most effective and potential anti-cancer agents in humans [67]. In vitro studies of root polysaccharide fraction (MP-1) showed that its antioxidative nature exhibited a significant function in the hepatoprotective action of maca in animal trials and cell models [68]. A significant in vitro repressing effect was observed against human influenza Type B (Flu-B) and Type A (Flu-A) viruses, infected in cells of Madin–Darby canine kidney (MDCK) when administered with a maca root powder extracted from methanol at an amount of 10–80 μg/mL [50]. In another study, it was reported that consumption of dried maca root powder (0.6 g/day), for a period of 90 days by different volunteers, decently expanded the level of plasma aminotransferase and diastolic blood pressure [69].

6. Amla

Amla, scientifically known as *Emblica officinalis*, belonging to a Euphorbiaceae family, is quite possibly the most well-known therapeutic herb utilized in ayurvedic proprietary medications. Similar names to *Emblica officinalis* are *Phyllanthus emblica* or Indian goose berry, notable for its nutritional characteristics, contains an assortment of chemical compounds including tannins, amino acids, mucic acid, flavone glycosides, alkaloids, sesquiterpenoids, phenolic glycosides, flavonolglycosides, phenolic acids, carbohydrates, and norsesquiterpenoids [70]. These are local to India and found in tropical as well as subtropical areas involving South East Asia, Sri Lanka, Pakistan, Uzbekistan, Malaysia, and China [71]. All parts of the plant are utilized in the treatment and counteraction of different illnesses, but the fruit, which has a globular shape, yellowish-green color, smooth and fleshy, is of massive use in traditional and folk medicine. The fruit is also utilized as a source of culinary use in the manufacturing of chutneys, pickles, and vegetable dishes. Amla is additionally utilized to make up a sweet delicacy known as murabba, in which the soaking of fruit (ripened) in concentrated sugar syrup is completed for the expanded time till the smell of the fruit oozes into the syrup of sugar. Preparation of fresh juice is possible with the help of ripe fruit and it has been marketed as a source of concentrate for the preparation of readily usable diluted juice [72]. Fruit juice of amla contains the most noteworthy measure of vitamin C (478.56 mg/100 mL) when contrasted with different fruits, for example, apple, pomegranate, lime, Pusa Navrang grape, and Perlette grape [73].

6.1. Nutritional Composition of Amla

6.1.1. Macro-Nutrients

The macro-nutrient profile of amla mainly involves protein, carbohydrate, fiber, and fat, having values of 6.04 g, 82.91 g, 2.78 g, and 0.51 g (per 100 g), respectively. The total amino acid profile consists of proline (14.6%), aspartic acid (8.1%), glutamic acid (29.6%), lysine (5.3%), and alanine (5.4%). Gallic acid, albumin, tannin gum, moisture, crude cellulose, and minerals having values of 1.32%, 13.08%, 13.75%, 3.83%, 17.08%, and 4.12%, respectively, were reported in the fruit's pulpy portion, freed from the nuts and dried [74].

6.1.2. Micro-Nutrients

Amla is considered to be an abundant source of alkaloids, tannins, and phenolic compounds. Its fruit juice involves the most elevated content of vitamin C, having a value of 478.56 mg/100 mL. The fruit when mixed with different fruit products, assist in boosting their nutritional content, regarding mainly vitamin C concentration [75]. The presence of various phytoconstituents such as chlorogenic acid (17.43 mg), gallic acid (37.95 mg), quercetin (2.01 mg), and ellagic acid (71.20 mg) was identified per 100 mL of *E. officinalis* fruit juice [76]. Ellagic acid, gallic acid, (3,6-di-O-galloyl-D-glucose), 1-O-galloyl-beta-D-glucose, 3-Ethylgallic acid, quercetin, chebulagic acid, (1,6-di-O-galloyl beta D glucose), corilagin, chebulinic acid, and isostrictiniin are among the different compounds extracted and identified in amla [77]. Flavonoids contained in amla generally include kaempferol 3-O-a-L-(600-methyl)-rhamnopyranoside, quercetin, and kaempferol 3-O-a-L-(600-ethyl) rhamnopyranoside [78]. The mineral content profile of *E. officinalis* fruit (per 100 g) generally includes phosphorus, calcium, magnesium, iron, potassium, chromium, zinc, copper, and nicotinic acid having values of 159 mg, 129 mg, 46 mg, 11 mg, 2.54 mg, 0.82 mg, 0.23 mg, 0.22 mg, and 0.2 mg, respectively [70].

6.2. Health Benefits of Amla

All aspects of *E. officinalis* are valuably inferable from its pharmaceutical and medicinal functionality. Different positive effects exhibited by the plant generally include anti-inflammatory, antioxidant, adaptogenic, anticancer, nootropic, anti-diabetic, antimicrobial, and immunomodulatory potential [79]. Apart from exhibiting effective effects on various diseases, *E. officinalis* likewise aids in the inhibition of osteoporosis, hyperlipidemia, and a few different illnesses [80] (**Table 1**). Effective action of antioxidant properties of amla is associated due to the existence of chemicals similar to ascorbic acid mainly involving pedunculagin, emblicanin B, emblicanin A, punigluconin, and gallic acid [70]. A clinical study including treatment with *E. officinalis* for a period of 21 days indicated that amla not just effectively diminished fasting and level of blood glucose at 2 h post-prandial in human volunteers suffering from diabetes, but additionally delivered a decrease in triglyceride (TG) and total cholesterol levels in subjects getting administered by *E. Officinalis* powder at a concentration of 1, 2, or 3 g each day. Additionally, potential enhancement in high-density lipoprotein-cholesterol (HDL) and decrease in low-density lipoprotein-cholesterol (LDL) level was observed in healthy as well as diabetic human volunteers, when administered with 2, 3 g of *E. officinalis* powder per day [81]. *E. officinalis* shows effective anti-diabetic action due to the presence of its vital phytoconstituents involving corilagin, gallotannins, gallic acid, and ellagic acid, interceded through free radical scavenging action by its antioxidants [82]. Various preclinical investigations with animals demonstrated that amla has cardio-shielding and anticoagulant adequacy and henceforth can be utilized for compelling treatment in deferring as well as forestalling different cardio related diseases. This defensive action of amla is ascribed to the presence of tannins, explicitly ellagic acid, emblicanin-A and B, and corilagin [83]. Various concentrates of Triphala (an ayurvedic exclusive formulation) having amla in rich quantity were researched for anti-mutagenic action by utilizing Ames histidine reversal assay having TA100 and TA98 analyzer strains of *Salmonella typhimurium* counter to straight acting mutagens, sodium azide, and NDP, and 2-aminofluorene (which are pro-mutagen executing indirect action), in the presence of hepatic S9 liver homogenate segment of the phenobarbitone-induced rat. Results uncovered that treatment with amla can repress mutagenicity initiated by immediate and incidental mutagen [84]. Numerous researchers have examined the *E. officinalis* hepato-protective functionality on CCl4-encouraged intense hepatic impairment and found that therapy with amla decreased focal necrosis and liver infiltration and it was additionally discovered that normal histology was seen in livers from treated animals [70]. Amla shows its anticancer effect through restraint of activator protein-1 and earmarks translation of viral oncogenes capable of the advancement of cervical cancer, hence illustrating its capability for therapy of cervical cancer instigated by human papillomavirus [85].

7. Camel Milk

Milk derived from camels is generally differentiated into two distinctive species, associated with genus Camelus, namely Dromedary camels (one-humped), which particularly reside in desert portions, and Bactrian camel (two-humped), which resides within cooler regions [86]. It is broadly conceded that dromedary camels deliver more quantity of milk involving rich nutritional constituents and for a more extended period than different species in an environment which will be appropriately named as antagonistic in terms of drought condition, high temperature, and deficiency of pasture. The camel can deliver milk of great composition and amount for human utilization when water is extremely limited. Both species of camel have the capability of producing around 1000 to 2000 L of milk per lactation phase during the duration of 8–18 months. Milk production between 3 to 10 kg is assessed to be executed by camels during 12–18 months of lactation phase [86]. When compared to bovine milk (BM), camel milk (CM) is considered to be a potentially effective substitute as it improves digestibility and functionality of the gastrointestinal system in human beings [87][88]. Apart from providing different nutritional benefits, CM has the potential to exhibit various therapeutic properties in humans [89]. The presence of various compounds and constituents involving a huge amount of fatty acids, fructose, and vitamin C, as well as various antimicrobial mediators involving lactoferrin, lysozyme, immunoglobulin, lactoperoxidase, and bacteriocins, demonstrates that CM is an effective product, having high stability and a rich nutritional profile. The shelf life of CM is assessed to be 5 days when kept at a temperature of 30 °C, considered effective when compared to bovine milk (48h) [90]. Anti-diabetic, anti-cancer, and hypo-allergic are the different properties exhibited by CM. The presence of a large and abundant amount of unsaturated fatty acids adds to the dietary superiority of CM [91]. Camel milk has been endorsed to be consumed by children who are unfavorably susceptible to the allergenicity of bovine milk (BM) [86].

7.1. Nutritional Composition of Camel Milk

7.1.1. Macro-Nutrients

Different CM components are generally influenced by the amount of water accessible to the camel. Dilution of CM is greater (91%) when compared to bovine milk, which is considered to be effective for a calf in desert areas [92]. Diversification is seen in the composition of CM, compared to the milk obtained from different ruminants. It exhibits lower sums of fats, carbohydrates, and proteins, but higher sums of minerals and vitamins. CM constitutes a low-fat concentration majorly involving 96% triglycerides (TGs) and very low content of cholesterol, i.e., 30 mg/100 g dry matter. The major constituents of fats are long-chain fatty acids (92–99%), although CM is a destitute source of short-chain fatty acid. Fatty acids are consisted primarily of saturated fatty acids (50–65%) and polyunsaturated fatty acids composed of 35–50% of total fatty acid content, considered superior to different milk sources. The white color of CM is because of the presence of a low amount of carotenes and a homogenous form of fatty acids [93]. CM is a vital source of proteins for different types of populations [94]. There is a slight variation in total protein content even in the same breeds, depending upon the different season surroundings, ranging between 2.5 to 5.5% [92]. CM proteins are generally differentiated into two types—whey protein (WP) and casein protein (CP). CP (80%) is the major constituent of bovine milk protein, though the concentration of CP in CM is around 50–80%, chiefly involving three components namely β, αs1, and αs2 having values of 65%, 22%, and 9.5%, respectively [95]. Following CP, WP is the second chief fraction of CM protein, constituting about 30% of the whole protein fraction [92]. The α-lactalbumin, thermo-steady immunoglobulins, lactoferrin, and camel serum albumin chiefly constitutes WP in CM [93]. CM contains a more noteworthy quantity of proteins with a positive function in immunology frameworks than bovine milk protein, mainly constituting N-acetyl glucosaminidase, lactoperoxidase (LP), secretory IgM, and IgA, peptidoglycan recognition protein, serum albumin, and insulin and insulin resemblance proteins [96]. Lysozyme (3000 mg/mL) and niacin constitute a considerable higher amount in CM [93]. Lactose is the main carbohydrate present in CM, having a concentration between 2.4 and 5.8% [91]. Lactose concentration is the only constituent that remains unaltered despite different seasons and under dehydrated or hydrated circumstances [86].

7.1.2. Micro-Nutrients

CM is considered to be a rich and abundant source of different types of vitamins, chiefly involving vitamins C, D, E, B, and A. The concentration of vitamins was accounted to be higher than bovine milk by three to five times. The vitamin C content in CM was found to be 34.16 mg L^{-1}. The content of vitamin B12 and B6 of CM resembles cow milk, while vitamin B2, B1, pantothenic acid, and folic acid were found to be in lower concentrations. According to the United States Department of Agriculture (USDA), 250 mL concentration of CM has the potential of providing an adult with riboflavin (8.25%) (B2), cobalamin (15.5%) (B12), vitamin A (5.25%), 10.5% of thiamine (B1), pyridoxine (B6), and ascorbic acid (C) of the Recommended Daily Intake (RDI) [86]. The total ash is generally the representation of the total concentration of minerals, having an amount ranging between 0.60 to 0.90% and an average of 0.79 ± 0.07 in CM [91]. When compared to bovine milk, the concentration of minerals such as K, Na, Mn, Fe, and Cu was found to be higher in CM [97]. The standard deviation (SD) and mean values (MV) of CM minerals chiefly involve calcium, sodium, potassium, iron, zinc, manganese, and magnesium, having values of 114 ± 13 mg 100 g^{-1}, 59 ± 16 mg 100 g^{-1}, 156 ± 38 mg 100 g^{-1}, 0.29 ± 0.09 mg 100 g^{-1}, 0.53 ± 0.08 mg 100 g^{-1}, 0.05 ± 0.03 mg 100 g^{-1}, and 10.5 ± 1.8 mg 100 g^{-1} [86]. CM contains different types of defensive proteins, primarily enzymes that exhibit immunological and antibacterial properties, chiefly involving peptidoglycan acknowledgment protein (PGRP), lactoperoxidase, lactoferrin, and lysozyme [98].

7.2. Health Benefits of Camel Milk

Table 1 shows the health benefits of camel milk. The acknowledgment of CM over cow milk as a good alternative for the nourishment of humans has been accomplished for a significant period in different regions of the world [98]. Numerous reports have been published regarding the medicinal and adjuvant properties of CM, suggesting its potential role in the enhancement of human immune defense functionality due to the presence of protective proteins. Rotaviruses are considered to have the potential of causing nonbacterial gastroenteritis in calves or infants in different areas of the world. The components present in CM are considered to be effective against rotavirus (extracted from human sources or bovine) are secretory immunoglobulin A (sIgA) and immunoglobulin (IgG) [99]. The inhibition of gram-positive and negative bacteria involving *Salmonella typhimurium, Listeria monocytogenes, Staphylococcus aureus*, and *Escherichia coli* is exhibited due to the occurrence of hydrogen peroxide, lysozyme, and lactoperoxidase in CM [98]. CM is utilized for the therapy and prevention of distinctive kinds of human tuberculosis involving fresh, empyema, multiple drug-resistant (MDR), and chronic pulmonary patients. A study directed on the action of camel milk on numerous drug resistance patients suffering from tuberculosis determined that camel milk can act as a source of adjuvant nutritional supplement in MDR patients [100]. It has been reported that lactic acid bacteria present in fermented CM can exhibit protection against contamination of lead. One of the foremost habitually portrayed issues in toxicity of lead is saturnism, frailty, and cancer. The fermented CM product is popularly known as ‘Shubat’ and has the potential in diminishing the accessibility of lead in the digestive tract of humans as lactic acid bacteria (LAB) has the capability in the absorption of lead, which is then ultimately excreted through feces [98]. The CM has the potential of contributing to the activity of hypoglycemic in type 1 diabetes in humans through the occurrence of the high content of half-cystine (insulin resemblance substance) [101], the impact on β-cell through small-sized immunoglobulins [102] and the absence of coagulation of CM in the stomach of humans [103]. The CM can be considered as a capable alternative in terms of source of protein for children susceptible to the allergenicity of bovine milk. CM is anticipated for causing small hypersensitivity responses since CM proteins and their fractions comparatively resemble that present in human milk [104].

8. Jackfruit

Jackfruit, scientifically known as (*Artocarpus heterophyllus* Lam.), is associated with the Moraceae family. The fruit production is mainly carried out in India, following Bangladesh, and in numerous areas of the southeast region of Asia. It is one of the foremost noteworthy evergreen trees, residing in tropical ranges and broadly developed in Asia, majorly involving India. The height of a medium-sized tree varies between 28 to 80 ft. The fruit is generally seen on the main as well as side branches of the tree. The normal weight of the jackfruit ranges between 3.5 to 10 kg and sometimes it can grow up to 25 kg [105]. Jackfruit is considered to be non-seasonal in nature and has potential in the contribution of supply of food to different people and their livestock, where there is a shortage of supply of food grains. Subsequently, it is alluded to as poor man’s food. After becoming mature, the jackfruit should be readily utilized for consumption to avoid the development of exceptionally sharp off flavor. Hence, it is generally advised to harvest the fruit before ripening on the tree (in semi-ripen and firm condition) and then immediately storing is executed until it becomes appropriately fit and soft in nature, favorable for further processing [106]. Jackfruit seeds are also considered to be a superior source of nutrients and are consumed raw or through processing. These are mainly used in cooking various dishes as well as their flour is utilized for baking purposes. Jackfruits are usually utilized as a vegetable source for cooking, production of nutritious salads and curries. Ripe jackfruit can be eaten in many forms ranging from raw, cooked (usually as a desert in creamy coconut milk), jackfruit candy, and consumable leather of jackfruit [105]. In India, the jackfruit seeds are consumed in a form of a dessert by boiling them in sugar. Jackfruit is a well-known nourishment-giving food and positions the third place in yearly production in South India after banana and mango. Jackfruit seeds and pulp are considered superior in terms of calcium, protein, thiamine, and iron content compared to tropical fruits like papaya, pineapple, mango, orange, and banana [107].

8.1. Nutritional Composition of Jackfruit

8.1.1. Macro-Nutrients

Jackfruit is a good source of varied portions of macro-nutrients. The edible portion of young jackfruit (per 100 g) contains a rich amount of macro-nutrients majorly involving carbohydrate (9.4–11.5 g), fat (0.1–0.6 g), protein (2.0–2.6 g), fiber (2.6–3.6 g), energy (50–210 kJ), and water (76.2–85.2 g) and that of ripe jackfruit (per 100 g) contains carbohydrate (16–25.4 g), fat (0.1–0.4 g), protein (1.2–1.9 g), fiber (1.0–1.5 g), energy (88–410 kJ), and water (72–94 g) content, respectively [108]. Jackfruit consists of a low amount of calorie content, with 94 calories per 100 g of fruit [109]. Various studies have shown that there are fluctuations in protein and carbohydrate contents of jackfruit seeds in different varieties, despite growing in the same region [107]. The protein and carbohydrate content of distinctive species of jackfruit seed varies between 5.3 to 6.8% and 37.4% to 42.5%. Depending on various histological and chemical studies, the presence of a decent amount of starch is reported in jackfruit seed and perianth areas. The flesh of ripened jackfruit (per 100 g) contains 1.9 g of protein. Studies have shown that with an increase in the maturity of flesh, the content of dietary fiber and starch increases. Jackfruit is considered to be a rich source of different amino acids, mainly cysteine, arginine, leucine, histidine, methionine, lysine, tryptophan, and threonine [106].

8.1.2. Micro-Nutrients

Jackfruit contains an exceptional amount of micro-nutrients mainly involving riboflavin, vitamin C, vitamin A, thiamine, potassium, calcium, sodium, iron, niacin, and zinc [109]. Apart from nutrients, jackfruit is known to be an exceptionally good source of diverse classes of compounds involving flavonoids, carotenoids, tannins, and volatile sterols [107]. Jackfruit is considered to be a decent source of varied types of minerals consisting of calcium (31.28 mg), magnesium (36.96 mg), copper (0.38 mg), iron (3.26 mg), manganese (0.56 mg), and lead (0.20 mg) per 100 g of fruit [106]. Jackfruit contains a considerably higher amount of potassium (303 mg per 100 g of fruit). Different types of chemical constituents are present in jackfruit majorly involving morin, flavone colorings, cynomacurin, dihydromorin, isoartocarpin, artocarpin, cyloartocarpin, coxydihydroartocarpesin, artocarpesin, norartocarpetin, artocarpetin, artocarpanone, and cycloartinone [105]. The phytochemicals contribute a greater part in jackfruit, mainly the phenolic compounds, and assist in the enhancement for creation of value-added goods, such as applications in food and nutraceuticals for the improvement and maintenance of human health [110]. Jackfruit contains 0.36 mg GAE/100 g DW [milligrams of gallic acid equivalent per gram of dry weight] of total phenolic content. Vitamin C is an important component of jackfruit constituting 12 to 14 mg per 100 g of fruit. Flavonoids, carotenoids, and associated polyphenols, such as glutathione and α-lipoic acid constitute a major class of nonenzymatic antioxidants. Apart from carotenoids, lutein, lycopene, and beta-carotene are also considered to be superior types of antioxidants [105]. The chief types of carotenoids mainly found in jackfruit are all-*trans*-lutein, all-*trans*-β-carotene, all-*trans*-neoxanthin, 9-*cis*-neoxanthin, and 9-*cis*-violaxanthin having values of 24–44%, 24–30%, 4–19%, 4–9%, 4–10%, respectively [111].

8.2. Health Benefits of Jackfruit

Table 1 shows the health benefits of jackfruit. The chief advantage of the consumption of jackfruit is due to the presence of a rich concentration of vitamin C. The human body is unable to produce a considerable amount of vitamin C. Hence, humans must consume vitamin C rich foods to procure their well-being benefits. The protection against free radicals, due to the action of antioxidants in the body, keeping healthy gums and enhancement of the immune system are some of the benefits of vitamin C [110]. The presence of a rich amount of phytonutrients in jackfruit mainly involving saponins, lignans, and isoflavones exhibits a wide range of health benefits. This fruit supports exhibiting antiulcer, antiaging, antihypertensive, and anticancer functions, and aids in the prevention of the development of cancer cells in the body, battling against stomach ulcers, ameliorating blood pressure, and inhibits degradation of cells, which in turn helps in making skin look effectively young. The presence of niacin (vitamin B3) in jackfruit is considered to be vital for the metabolism of energy, synthesis of different hormones, and functioning of the nervous system [105]. The potassium present within the jackfruit is found to assist in bringing down blood pressure at optimum level and altering the impacts of sodium, responsible for causing an increase in blood pressure that negatively influences the blood and heart vessels. Another benefit of potassium involves the improvement of the functioning of nerves and muscles through the prevention of loss of bone. The presence of vitamin B6 in jackfruit assists in the decrease of levels of homocysteine in the blood. Thus, it ultimately assists in dropping the chances of heart illnesses [112]. The presence of different micro-nutrients helps in exhibiting potential health benefits. Iron (0.5 mg/100 g) assists in executing effective circulation of blood through the prevention of anemia. Copper (10.45 mg/kg) exhibits a vital function in the metabolism of the thyroid gland, particularly in the generation and absorption of the hormone. Magnesium (27 mg/100 g in fruit and 54 mg/100 g in seed) is considered to be a vital nutrient, assisting in the absorption of calcium and working with calcium in helping to reinforce the bone and inhibit bone associated diseases such as osteoporosis. The jackfruit helps in executing smooth movements of bowels through prevention of constipation due to the presence of the high amount of fiber content (3.6 g/100 g) and also exhibits protection to the membrane of mucous of the colon through the removal of carcinogenic chemicals present in the large intestine (colon) [105]. Jackfruit has the potential to display diverse positive health impacts, involving anti-inflammatory, antioxidant, anti-carcinogenic, antibacterial, prevention of biosynthesis of melanin, hypoglycemic, anti-neoplastic, positive impact on sexual performance, and healing of the wound [107].

9. Goji Berry

Goji berries, scientifically known as *Lycium barbarum*, are known to be consumed throughout Asia and have been utilized as a source of conventional medication in China for about 2000 years. Within the field of food, the persistent modification in demands of consumers, with an expanding amount of individuals looking for conventional and intriguing foods, has helped in bringing goji berries into Western countries, where these are now abundantly utilized and consumed [113]. Wolfberry is the most common name given to goji beery, and is derived from the word "gou", which is associated with the word wolf [114]. Goji berries are generally ellipsoid in shape, having orange-red color, 2 cm in size, and exhibiting a tangy and sweet flavor [115]. The drying of goji berries assists in yielding of market herb or squeezing of fruit for the generation of fruit juice, which is then preserved for a longer time in the future for the production of different nutritionally rich beverages such as tea and wine [116]. The dosage of goji berries in the range of 6–18 g is usually used in incorporating it into herb formulas [117]. The goji berries have recently been showcased as dietary and food supplements in numerous nations including Caribbean countries, the European Union, North America, Southeast Asia, New Zealand, and Australia in different retail outlets, involving chief general stores, supermarkets, and direct channels of marketing [118].

9.1. Nutritional Composition of Goji Berries

9.1.1. Macro-Nutrients

The major source of macro-nutrients in goji berries is carbohydrate (46%), protein (13%), fat (1.5%), and dietary fiber (16%), and it is considered as an abundant source of macro-nutrients [119]. The polysaccharides are considered to be the foremost well-researched chemical component present in goji berries, which are water-soluble glycoconjugate in nature, constitute 5–8% of 100 g of dried fruit, and have the potential to exhibit vital biological actions [120]. The dietary fiber is present in notably good amounts in dry goji berries, majorly differentiated into two forms: water-soluble (2.6%) and water-insoluble (8.8%). The ratio between the two (soluble and insoluble) is generally 3:1. The daily consumption of 30 g of dried goji berries can help in fulfilling 14% of the recommended intake of the daily dietary fiber. Considering this aspect, European law has announced dried goji berries with the claim of "high fiber content" under regulation CE 1924/2006 due to the presence of 6 g of fiber per 100 g of fruit. The energy content is comparatively high in both fresh and dried goji berries, giving individually approximately 87 and 348 kcal per 100 g [121]. The complex of polysaccharides is considered to be the foremost imperative and copious collection of compounds existing in goji berries. These are mainly found to be present in form of water-soluble highly branched polysaccharides of goji berries, having 8–214 kDa of molecular weight and constituting 5–8% of the overall dry matter of fruit. Their composition incorporates six sorts of monosaccharides such as rhamnose, arabinose, mannose, xylose, galacturonic, glucose, and galactose acid. Goji berries are a good source of amino acids, involving a total of 18 amino acids [118]. The fatty acids constitute a greater part of the macro-nutrients of goji berries mainly including myristic, linoleic, and palmitic acids [115].

9.1.2. Micro-Nutrients

Goji berry is one of a kind in its assortment and total content of phytochemicals. The presence of varied types of phytochemicals mainly involves flavonols, phenolic amides, flavan-3-ols, coumarin, phenolic acids, and monoterpenes. The isolation of two monomers, namely NE- feruloyl tyramine and N-E-coumaroyl tyramine, along with three novel dimers of phenolic amides-lyciumamides C, B, and A was exhibited for the first time in goji berries. The most characteristic phenolic acids were dihydroxybenzoic acid and esters of hydro cinnamic with quinic acid. The most dominant phenolic acids included coumaric, caffeic, and isoferulic acids [122]. The carotenoids are the major coloring components of goji berries, exhibiting exceptional biological activities with health benefits. The carotenoid constituents of different cultivars of goji berries are present in a range of 0.03 to 0.5% per 100 g of dried goji berry fruit [123]. Zeaxanthin is considered to be the most abundant and common form of the carotenoid present in goji berries, usually in the form of dipalmitin zeaxanthin. These constitute around 77.5% of total carotenoids in ripe goji berries, considering goji berries as its chief natural source. Apart from dipalmitin zeaxanthin, zeaxanthin palmitate, also known as phasalien, is an important carotenoid constituting 31–56% of the total carotenoids. The identification of fractions of neoxanthin, cryptoxanthin, and beta-carotene are reported in goji berry extracts [124]. The presence of different types of small molecules is reported in goji berries mainly involving beta-sitosterol, betaine, p-coumaric acid, and cerebroside [118]. The presence of diverse vitamins including riboflavin, ascorbic acid, and thiamine contributes to a greater part of micronutrients in goji berries. Approximately 42 mg/100 g of vitamin C was reported to be found in goji berries [114]. Apart from vitamins, different types of minerals are present in good amounts in goji berries, including potassium, sodium, phosphorus, magnesium, and calcium having values of 1460 mg, 550 mg, 184 mg, 90 mg, and 50 mg per 100 g of fruit, respectively. It was reported that the iron content (5.5 mg/100 g) in goji berry was higher when compared to the Dietary Reference Intake (DRI) [125]. The presence of fumaric, shikimic, malic, and citric acids signifies goji berries as a rich source of organic acids [126].

9.2. Health Benefits of Goji Berries

Table 1 shows the health benefits of goji berries. Goji berries have customarily been utilized as a functional food and as a complementary pharmaceutical agent for over 2500 years with restricted toxicological indications detailed within the literature or in conventional textbooks of Asian herbal medications [118]. Goji berries have become prevalent over a long time due to their open acknowledgment as a "superfood" with a profoundly huge amount of antioxidant and nutritive properties. The content of carotenoids in goji berries had been drawn a part of consideration due to its valuable impacts involving property of antioxidant on vision, degeneration of macular, and retinopathy [117]. The defensive characteristics of extracts of goji berry on cells of the retina have appeared within the early stages of the degeneration of the retina in both studies of animals and humans [115]. The goji berries have shown a significant positive effect on diabetes mellitus (hyperglycemia) through hypoglycemic activity in both animal and cell studies. The experimentation of cells on the impact of hypoglycemic demonstrated that LBP3b (an extraction from goji berry) exhibited a concentration-dependent impact on the uptake of glucose [117]. Goji berries are utilized in conventional Chinese medication to avoid the progression and onset of cancer for a long period, due to the presence of numerous antioxidants and phytochemicals [115]. Studies have been published regarding the effectiveness of carotenoid nano emulsion in inhibition of HT-29 cells of cancer, considered superior compared to the carotenoid extracts [127]. The neurological defensive impact of goji berries has been illustrated in an experimental test, considering the clinical trial of humans. The presence of glutamate in goji berries is shown to effectively demonstrate the excitotoxic effect in different neurological diseases such as Alzheimer's and Parkinson's [128]. The presence of different components in goji berries demonstrate anti-aging effects, mainly including betaine, LBPs, flavonoids, zeaxanthin, β-carotene, and 2-O-β-D-glucopyranosyl-L-ascorbic acid (AA-2βG) [129].

Table 1. Nutritional Composition and health benefits of superfoods.

Superfood	Major Macro-/Micro-Nutrient Involved in Superfood	Health Effects	Studied Population	Possible Outcome	References
Brazil nuts	Selenium (Se)	Thyroid cancer, breast cancer	Animal study	The presence of the high amount of selenium helps in the prevention of disease as well as maintains normal functioning of the affected organs	[10][130]
		Prostate cancer	A study of 35,534 males from Puerto Rico, Canada, and the United States was conducted across more than 400 clinical sites.	A high intake of Se lowers the risk of prostate cancer.	[131]
		Mammary cancer	Animal study (rat)	There is a clear link between the amount of Brazil nuts ingested and enhanced Se retention in the mammary gland, liver, kidney, and plasma, resulting in the prevention of breast cancer.	[132]
		Selenium deficiency	Conduction of randomized controlled trial including 59 New Zealand adults	The daily consumption of two Brazil nuts is seen to be effective in enhancing the status of selenium and improving GPx activity as 100 μg Se as selenomethionine.	[133]
		Type-2 diabetes	A research study conducted including sixty patients (ages between 43 and 81) who had been diagnosed with T2D for more than five years	Brazil nut intake may reduce oxidative DNA damage in T2D patients, owing to the antioxidative properties of selenium.	[134]
	Phenolic compounds	HepG2 human liver and Caco-2 human colon cancer.	-	Caco-2 and HepG2 cell growth is inhibited, leading to antiproliferative action.	[23]
	–	Inflammatory parameters	With ten healthy people, a randomized crossover study was undertaken. (mean age 24.7 ± 3.4 y).	In healthy participants, the results show a long-term reduction in inflammatory markers following a single big serving of Brazil nuts.	[135]

Superfood	Major Macro-/Micro-Nutrient Involved in Superfood	Health Effects	Studied Population	Possible Outcome	References
Hempseeds	Hempseed protein isolate	Hydrogen peroxide-induced apoptosis in PC12 cells	Animal studies (rat)	Hemp seed protein isolate generally includes two peptides (NHAV and HVRETALV), resulting in the survival rate enhancement of peptide-treated rat PC12.	[35]
	-	Decreased blood lipid profile	Animal studies (rat and rabbit)	After consuming hempseed supplements, rats and rabbits showed improvements in their blood lipid profiles.	[136][137]
	Phenylpropionamides (TPA)	Memory loss	Animal studies (rat)	The TPA extract research reported a reversal in memory loss. The TPA extract might also lower the levels of inflammatory cytokines (TNF-α, IL-1β, and IL-6) at a modest dosage (1 g/kg).	[138]
	-	Coronary heart disease	A study was conducted on sixteen healthy volunteers (eight males and eight females), without suffering from any chronic illness.	After consumption of 30 mL/day of hempseed oil (HO) for four weeks, the researchers discovered increased LA and GLA levels in the blood plasma of healthy human volunteers.	[139]

Superfood	Major Macro-/Micro-Nutrient Involved in Superfood	Health Effects	Studied Population	Possible Outcome	References
Garden Cress Seeds	n-butanol/n-methanol	Asthma	Animal studies (guinea pig)	Garden cress seeds offered broncho-protection, indicating that it has anti-asthmatic potential, which has been extensively supported by clinical research.	[140]
	-	Pain, inflammation, and fever	Animal studies (mice)	Garden cress is considered to be of therapeutic value in the treatment of inflammation, nociception, and hyperthermia.	[141]
	Methanol extract	Blood coagulation	-	A substantial rise in fibrinogen levels, but no change in prothrombin time, indicated the role of garden cress in blood coagulation of and associated diseases.	[141]
		Diuretic effect	Animal studies (rats)	Garden cress seed may be beneficial in hypertension treatment and associated kidney diseases since it increases sodium and potassium excretion when consumed.	[140]
	-	Estrogenic activity	Animal studies (rats)	As volatile oil derived from garden cress seed was given to the diet of immature rats (3-4 drops), they exhibited development and an increase in the weight of their ovaries when compared to the control group.	[140]
	Benzyl isothiocyanate	Breast cancer	-	The aqueous extract of *L. sativum* exhibited a cytotoxic impact on MCF-7 breast cells, producing substantial time- and dose-dependent viability reductions.	[142]

Superfood	Major Macro-/Micro-Nutrient Involved in Superfood	Health Effects	Studied Population	Possible Outcome	References
Maca	Polysaccharides	Fatigue	Animal study.	Consumption of maca exhibited effective anti-fatigue activity	[65]
		Immunomodulatory effect	-	Maca polysaccharides possess immunomodulatory activity, raising the levels of NO, TNF-α, and IL-6 in macrophage cells and boosting their pinocytic and phagocytic capabilities.	[143]
		Anti-tumor effect	-	The activity of HepG-2 cells was considerably inhibited by the maca polysaccharides (MP21) group in a dose-dependent manner.	[144]
		Hepatoprotective activity	Animal study (mice).	MP-1 polysaccharide reduced the inflammation induced by ethanol, and MP-1 may have a hepatoprotective impact in the defense against liver damage, according to histopathologic findings.	[68]
	Macamides	Neuroprotective activity	Animal studies (mice)	The enhancement in spatial memory and learning, the capacity of swimming endurance, and motorcoordination were observed.	[145]
	Polyphenol, antioxidants, and phytosterol	Sexual function	Animal and humans study.	Maca is effective in the improvement of sexual function in both males and females.	[50][146]

Superfood	Major Macro-/Micro-Nutrient Involved in Superfood	Health Effects	Studied Population	Possible Outcome	References
Amla	-	Cancer	Animal and human study	Amla's potent anti-cancer activity is controlled by free radical scavenging, immunological regulation, anti-oxidant enzymes, and other mechanisms.	[72]
	-	Diabetes	In the study, 32 volunteers (16 diabetes patients and 16 age- and gender-matched normal people) took part.	In diabetic human volunteers, *E. officinalis* not only lowered fasting and 2 h postprandial blood glucose levels but also reduced total cholesterol and triglyceride (TG) levels in patients taking 1, 2, or 3 g *E. officinalis*.	[81]
	-	Hyperlipidemic syndrome	Animal studies (rats)	A significant decrease in total and free cholesterol levels was seen in a dose-dependent manner.	[147][148]
	-	Tumor	Animal studies (mice)	Increased liver antioxidants enhance *E. officinalis* anti-tumor efficacy. This protective effect might be related to its antioxidant capability or its modulatory impact on liver detoxifying enzyme activity.	[149]
	-	Mutagenic activity	Animal studies (rat)	The treatment with *E. officinalis* can help in the inhibition of mutagenicity induced by indirect and direct mutagens.	[150]

Superfood	Major Macro-/Micro-Nutrient Involved in Superfood	Health Effects	Studied Population	Possible Outcome	References
Camel milk	Milk proteins	Hypocholesterolaemic effect	Animal studies (rats)	In an in vivo study in rats, the administration of fermented camel milk (Gariss) and Gariss containing Bifidobacterium lactis (BB-12) was shown to have a hypocholesterolaemic effect.	[86]
	Half-cystine	Hypoglycaemic effect	Animal and human study	Camel milk intake is beneficial to people with type 1 diabetes, as well as rats.	[86][151]
	lysozyme, lactoferrin, lactoperoxidase, hydrogen peroxide, and immunoglobulins.	Antimicrobial effect	-	Camel milk is antibacterial against Gram-positive and Gram-negative bacteria such as *E. coli*, *Listeria monocytogenes*, *Salmonella typhimurium*, and *Staphylococcus aureus*.	[86]
	-	Hypoallergenic effect	Blood samples were taken from 40 children who were allergic to bovine milk or its products.	Because the protein percentages in camel milk are close to those in human milk, certain hypersensitivity responses have been recorded.	[86]
	-	Diarrheal diseases	-	Camel milk has been shown to have unique anti-diarrheal properties, as well as inhibiting Johne's disease, autism syndrome, and Crohn's disease.	[152]

Superfood	Major Macro-/Micro-Nutrient Involved in Superfood	Health Effects	Studied Population	Possible Outcome	References
Jackfruit	Phytonutrient (lignans, saponins, and isoflavones).	Cancer	-	Jackfruit includes chemicals that may be useful in preventing or treating lymphoma cancer, as well as preventing the development of cancer cells in the body and fighting stomach ulcers.	[106]
	Chitin-binding lectin (jackin)	Fungal effect	Animal and human study.	The ability of jackin to prevent the growth of *Saccharomyces cerevisiae* and *Fusarium moniliforme* as well as hemagglutination activity was also demonstrated against rabbit and human erythrocytes.	[106]
	Potassium and vitamin B6	Cardiovascular disorder	-	The potassium found helps in the reduction of blood pressure and the reversal of the effects of sodium, which produces a rise in blood pressure that damages the heart and blood vessels. This aids in the prevention of heart attacks and strokes. Potassium also enhances muscular and nerve function while reducing bone loss. B6 is a vitamin that helps to decrease homocysteine levels in the bloodstream.	[105]
	Magnesium	Bone-related disorder	-	High magnesium concentration aids calcium absorption and works in tandem with calcium to build bones and prevent bone diseases like osteoporosis.	[105]
Goji berry	Glycoconjugated polysaccharides	Diabetes	-	Lipid peroxidation was reduced, plasma antioxidant status was increased, and immunological activities were improved. Red blood cell fragility and abnormalities have improved.	[122]
		Immune-stimulating	-	Increased serum influenza-specific IgG levels after vaccination and improved immune system.	[122]
	-	Eye disorder	-	Fasting plasma zeaxanthin content is higher, which aids in maintaining visual acuity.	[122]
	Polysaccharides	Ergogenic effect/exercise performance	Animal study (rats)	Longer exercise endurance and lower lipid peroxidation while increasing the amounts of endogenous antioxidant enzymes.	[122]
		Cancer	Animal study (mice)	In mice, goji polysaccharide fractions reduced lipid peroxidation and inhibited the growth of liver cancer cells.	[122]

References

1. Siró, I.; Kápolna, E.; Kápolna, B.; Lugasi, A. Functional Food. Product Development, Marketing and Consumer Acceptance-A Review. Appetite 2008, 51, 456–467.
2. Meyerding, S.G.H.; Kürzdörfer, A.; Gassler, B. Consumer Preferences for Superfood Ingredients-the Case of Bread in Germany. Sustainability 2018, 10, 4667.
3. Lunn, J. Superfoods. Nutr. Bull. 2006, 31, 171–172.
4. Hefferon, K. Let Thy Food Be Thy Medicine: Plants and Modern Medicine; Oxford University Press: Oxford, UK, 2012.
5. Tacer-Caba, Z. Chapter 3—The concept of superfoods in diet. In The Role of Alternative and Innovative Food Ingredients and Products in Consumer Wellness; Galanakis, C.M., Ed.; Academic Press: Cambridge, MA, USA, 2019; pp. 73–101. ISBN 978-0-12-816453-2.
6. Wolfe, D. Superfoods: The Food and Medicine of the Future; North Atlantic Books: Berkeley, CA, USA, 2009.
7. Rozin, P. The Meaning of Food in Our Lives: A Cross-Cultural Perspective on Eating and Well-Being. J. Nutr. Educ. Behav. 2005, 37, S107–S112.
8. Van den Driessche, J.J.; Plat, J.; Mensink, R.P. Effects of Superfoods on Risk Factors of Metabolic Syndrome: A Systematic Review of Human Intervention Trials. Food Funct. 2018, 9, 1944–1966.
9. Weitkamp, E.; Eidsvaag, T. Agenda Building in Media Coverage of Food Research. J. Pract. 2014, 8, 871–886.
10. Yang, J. Brazil Nuts and Associated Health Benefits: A Review. LWT Food Sci. Technol. 2009, 42, 1573–1580.
11. Pacheco, A.M.; Scussel, V.M. Aflatoxins Evaluation on In-Shell and Shelled Dry Brazil Nuts for Export Analysed by LC-MS/MS—2006 and 2007 Harvests. World Mycotoxin J. 2009, 2, 295–304.
12. Santos, O.V.; Corrêa, N.C.F.; Soares, F.A.S.M.; Gioielli, L.; Costa, C.E.F.; Lannes, S.C.S. Chemical Evaluation and Thermal Behavior of Brazil Nut Oil Obtained by Different Extraction Processes. Food Res. Int. 2012, 47, 253–258.
13. Maguire, L.S.; O'Sullivan, S.M.; Galvin, K.; O'Connor, T.P.; O'Brien, N.M. Fatty Acid Profile, Tocopherol, Squalene and Phytosterol Content of Walnuts, Almonds, Peanuts, Hazelnuts and the Macadamia Nut. Int. J. Food Sci. Nutr. 2004, 55, 171–178.
14. Ryan, E.; Galvin, K.; O'Connor, T.P.; Maguire, A.R.; O'Brien, N.M. Fatty Acid Profile, Tocopherol, Squalene and Phytosterol Content of Brazil, Pecan, Pine, Pistachio and Cashew Nuts. Int. J. Food Sci. Nutr. 2006, 57, 219–228.
15. Moodley, R.; Kindness, A.; Jonnalagadda, S.B. Elemental Composition and Chemical Characteristics of Five Edible Nuts (Almond, Brazil, Pecan, Macadamia and Walnut) Consumed in Southern Africa. J. Environ. Sci. Health Part B 2007, 42, 585–591.
16. Kannamkumarath, S.S.; Wrobel, K.; Wrobel, K.; Vonderheide, A.; Caruso, J.A. HPLC-ICP-MS Determination of Selenium Distribution and Speciation in Different Types of Nut. Anal. Bioanal. Chem. 2002, 373, 454–460.
17. Ampe, C.; van Damme, J.; de Castro, L.A.B.; Sampaio, M.J.A.M.; van Montagu, M.; Vandekerckhove, J. The Amino-Acid Sequence of the 2S Sulphur-Rich Proteins from Seeds of Brazil Nut (Bertholletia excelsa H.B.K.). Eur. J. Biochem. 1986, 159, 597–601.
18. Sm, S.S.; Altenbach, S.B.; Leung, F. Properties, Biosynthesis and Processing of a Sulfur-Rich Protein in Brazil Nut (Bertholletia excelsa H.B.K.). Eur. J. Biochem. 1987, 162, 477–483.
19. Strunz, C.C.; Oliveira, T.V.; Vinagre, J.C.; Lima, A.; Cozzolino, S.; Maranhão, R.C. Brazil Nut Ingestion Increased Plasma Selenium but Had Minimal Effects on Lipids, Apolipoproteins, and High-Density Lipoprotein Function in Human Subjects. Nutr. Res. 2008, 28, 151–155.
20. Ariane, M.K.; Maristela, M.; Silmara, M.M.; Renata, H.S.; Karine, S.N.; Helyde, A.M.; Augusto, K.J. Properties of Brazil Nuts: A Review. Afr. J. Biotechnol. 2015, 14, 642–648.
21. Bitok, E.; Sabaté, J. Nuts and Cardiovascular Disease. Prog. Cardiovasc. Dis. 2018, 61, 33–37.
22. Combs, G.F. Impact of Selenium and Cancer-Prevention Findings on the Nutrition-Health Paradigm. Nutr. Cancer 2001, 40, 6–11.
23. Yang, J.; Liu, R.H.; Halim, L. Antioxidant and Antiproliferative Activities of Common Edible Nut Seeds. LWT Food Sci. Technol. 2009, 42, 1–8.

24. Cromack, H.T.H. The Effect of Cultivar and Seed Density on the Production and Fibre Content of Cannabis Sativa: In Southern England. Ind. Crops Prod. 1998, 7, 205–210.

25. Russo, E.B. History of Cannabis and Its Preparations in Saga, Science, and Sobriquet. Chem Biodivers. 2007, 4, 1614–1648.

26. Callaway, J.C. Hempseed as a Nutritional Resource: An Overview. Euphytica 2004, 140, 65–72.

27. Bertoli, A.; Tozzi, S.; Pistelli, L.; Angelini, L.G. Fibre Hemp Inflorescences: From Crop-Residues to Essential Oil Production. Ind. Crops Prod. 2010, 32, 329–337.

28. Norajit, K.; Gu, B.J.; Ryu, G.H. Effects of the Addition of Hemp Powder on the Physicochemical Properties and Energy Bar Qualities of Extruded Rice. Food Chem. 2011, 129, 1919–1925.

29. Leonard, W.; Zhang, P.; Ying, D.; Fang, Z. Hempseed in Food Industry: Nutritional Value, Health Benefits, and Industrial Applications. Compr. Rev. Food Sci. Food Saf. 2020, 19, 282–308.

30. Crescente, G.; Piccolella, S.; Esposito, A.; Scognamiglio, M.; Fiorentino, A.; Pacifico, S. Chemical Composition and Nutraceutical Properties of Hempseed: An Ancient Food with Actual Functional Value. Phytochem. Rev. 2018, 17, 733–749.

31. Brenneisen, R. Chemistry and Analysis of Phytocannabinoids and Other Cannabis Constituents. In Marijuana and the Cannabinoids; ElSohly, M.A., Ed.; Forensic Science and Medicine; Humana Press: Totowa, NJ, USA, 2007; pp. 17–49. ISBN 978-1-59259-947-9.

32. Wang, Q.; Xiong, Y.L. Processing, Nutrition, and Functionality of Hempseed Protein: A Review. Compr. Rev. Food Sci. Food Saf. 2019, 18, 936–952.

33. Aiello, G.; Fasoli, E.; Boschin, G.; Lammi, C.; Zanoni, C.; Citterio, A.; Arnoldi, A. Proteomic Characterization of Hempseed (Cannabis sativa L.). J. Proteom. 2016, 147, 187–196.

34. Tang, C.H.; Ten, Z.; Wang, X.S.; Yang, X.Q. Physicochemical and Functional Properties of Hemp (Cannabis sativa L.) Protein Isolate. J. Agric. Food Chem. 2006, 54, 8945–8950.

35. Lu, R.R.; Qian, P.; Sun, Z.; Zhou, X.H.; Chen, T.P.; He, J.F.; Zhang, H.; Wu, J. Hempseed Protein Derived Antioxidative Peptides: Purification, Identification and Protection from Hydrogen Peroxide-Induced Apoptosis in PC12 Cells. Food Chem. 2010, 123, 1210–1218.

36. Russo, R.; Reggiani, R. Evaluation of Protein Concentration, Amino Acid Profile and Antinutritional Compounds in Hempseed Meal from Dioecious and Monoecious Varieties. Am. J. Plant Sci. 2015, 06, 14–22.

37. Chen, T.; He, J.; Zhang, J.; Li, X.; Zhang, H.; Hao, J.; Li, L. The Isolation and Identification of Two Compounds with Predominant Radical Scavenging Activity in Hempseed (Seed of Cannabis sativa L.). Food Chem. 2012, 134, 1030–1037.

38. Siano, F.; Moccia, S.; Picariello, G.; Russo, G.L.; Sorrentino, G.; di Stasio, M.; la Cara, F.; Volpe, M.G. Comparative Study of Chemical, Biochemical Characteristic and ATR-FTIR Analysis of Seeds, Oil and Flour of the Edible Fedora Cultivar Hemp (Cannabis sativa L.). Molecules 2019, 24, 83.

39. Pojić, M.; Mišan, A.; Sakač, M.; Dapčević Hadnađev, T.; Šarić, B.; Milovanović, I.; Hadnađev, M. Characterization of Byproducts Originating from Hemp Oil Processing. J. Agric. Food Chem. 2014, 62, 12436–12442.

40. Chen, T.; He, J.; Zhang, J.; Zhang, H.; Qian, P.; Hao, J.; Li, L. Analytical Characterization of Hempseed (Seed of Cannabis sativa L.) Oil from Eight Regions in China. J. Diet Suppl. 2010, 7, 117–129.

41. Zhou, Y.; Wang, S.; Lou, H.; Fan, P. Chemical Constituents of Hemp (Cannabis sativa L.) Seed with Potential Anti-Neuroinflammatory Activity. Phytochem. Lett. 2018, 23, 57–61.

42. House, J.D.; Neufeld, J.; Leson, G. Evaluating the Quality of Protein from Hemp Seed (Cannabis sativa L.) Products through the Use of the Protein Digestibility-Corrected Amino Acid Score Method. J. Agric. Food Chem. 2010, 58, 11801–11807.

43. Mamone, G.; Picariello, G.; Ramondo, A.; Nicolai, M.A.; Ferranti, P. Production, Digestibility and Allergenicity of Hemp (Cannabis sativa L.) Protein Isolates. Food Res. Int. 2019, 115, 562–571.

44. Singh, C.S. The Potential of Garden Cress (Lepidium sativum L.) Seeds for Development of Functional Foods. In Advances in Seed Biology; Jimenez-Lopez, V.K.P.E.-J.C., Ed.; IntechOpen: Rijeka, Croatia, 2017; p. 14. ISBN 978-953-51-3622-4.

45. Ramadan, M.F.; Oraby, H.F. Chapter 20—Lepidium sativum Seeds: Therapeutic Significance and Health-Promoting Potential. In Nuts and Seeds in Health and Disease Prevention, 2nd ed.; Preedy, V.R., Watson, R.R., Eds.; Academic Press: Cambridge, MA, USA, 2020; pp. 273–289. ISBN 978-0-12-818553-7.

46. Gokavi, S.S.; Malleshi, N.G.; Guo, M. Chemical Composition of Garden Cress (Lepidium sativum) Seeds and Its Fractions and Use of Bran as a Functional Ingredient. Plant Foods Human Nutr. 2004, 59, 105–111.

47. Jain, T.; Grover, K.; Kaur, G. Effect of Processing on Nutrients and Fatty Acid Composition of Garden Cress (Lepidium sativum) Seeds. Food Chem. 2016, 213, 806–812.

48. Diwakar, B.T.; Dutta, P.K.; Lokesh, B.R.; Naidu, K.A. Physicochemical Properties of Garden Cress (Lepidium sativum L.) Seed Oil. J. Am. Oil Chem. Soc. 2010, 87, 539–548.

49. Da Silva Leitão Peres, N.; Cabrera Parra Bortoluzzi, L.; Medeiros Marques, L.L.; Formigoni, M.; Fuchs, R.H.B.; Droval, A.A.; Reitz Cardoso, F.A. Medicinal Effects of Peruvian Maca (Lepidium meyenii): A Review. Food Funct. 2020, 11, 83–92.

50. Wang, S.; Zhu, F. Chemical Composition and Health Effects of Maca (Lepidium meyenii). Food Chem. 2019, 288, 422–443.

51. Zhao, J.; Avula, B.; Chan, M.; Clément, C.; Kreuzer, M.; Khan, I.A. Metabolomic Differentiation of Maca (Lepidium meyenii) Accessions Cultivated under Different Conditions Using NMR and Chemometric Analysis. Planta Med. 2012, 78, 90–101.

52. Jin, W.; Chen, X.; Huo, Q.; Cui, Y.; Yu, Z.; Yu, L. Aerial Parts of Maca (Lepidium meyenii Walp.) as Functional Vegetables with Gastrointestinal Prokinetic Efficacy in Vivo. Food Funct. 2018, 9, 3456–3464.

53. Li, G.; Ammermann, U.; Quirós, C.F. Glucosinolate Contents in Maca (Lepidium peruvianum Chacón) Seeds, Sprouts, Mature Plants and Several Derived Commercial Products. Econ. Bot. 2001, 55, 255–262.

54. Yábar, E.; Pedreschi, R.; Chirinos, R.; Campos, D. Glucosinolate Content and Myrosinase Activity Evolution in Three Maca (Lepidium meyenii Walp.) Ecotypes during Preharvest, Harvest and Postharvest Drying. Food Chem. 2011, 127, 1576–1583.

55. Dini, A.; Migliuolo, G.; Rastrelli, L.; Saturnino, P.; Schettino, O. Chemical Composition of Lepidium meyenii. Food Chem. 1994, 49, 347–349.

56. Zhang, L.; Li, G.; Wang, S.; Yao, W.; Zhu, F. Physicochemical Properties of Maca Starch. Food Chem. 2017, 218, 56–63.

57. Chen, L.; Li, J.; Fan, L. The Nutritional Composition of Maca in Hypocotyls (Lepidium meyenii Walp.) Cultivated in Different Regions of China. J. Food Qual. 2017, 2017.

58. Zhou, Y.; Li, P.; Brantner, A.; Wang, H.; Shu, X.; Yang, J.; Si, N.; Han, L.; Zhao, H.; Bian, B. Chemical Profiling Analysis of Maca Using UHPLC-ESI-Orbitrap MS Coupled with UHPLC-ESI-QqQ MS and the Neuroprotective Study on Its Active Ingredients. Sci. Rep. 2017, 7, 1–14.

59. Zheng, H.; Zhang, H.; Xu, L.; Zhang, W.; Gan, J. Volatile Analysis of Maca (Lepidium meyenii Walp.) by TCT-GC/MS. Adv. Mat. Res. 2013, 634–638, 1562–1565.

60. Beharry, S.; Heinrich, M. Is the Hype around the Reproductive Health Claims of Maca (Lepidium meyenii Walp.) Justified? J. Ethnopharmacol. 2018, 211, 126–170.

61. Melnikovova, I.; Fait, T.; Kolarova, M.; Fernandez, E.C.; Milella, L. Effect of Lepidium meyenii Walp. on Semen Parameters and Serum Hormone Levels in Healthy Adult Men: A Double-Blind, Randomized, Placebo-Controlled Pilot Study. Evid. Based Complement. Altern. Med. 2015, 2015, 324369.

62. Singh, H.P.; Sharma, S.; Chauhan, S.; Kaur, I. Clinical Trials of Traditional Herbal Medicines in India: Current status and challenges. Int. J. Pharmacogn. 2014, 1, 415–421.

63. Li, J.; Chen, L.; Li, J.; Duan, Z.; Zhu, S.; Fan, L. The Composition Analysis of Maca (Lepidium meyenii Walp.) from Xinjiang and Its Antifatigue Activity. J. Food Qual. 2017, 2017.

64. Li, S.; Hao, L.; Kang, Q.; Cui, Y.; Jiang, H.; Liu, X.; Lu, J. Purification, Characterization and Biological Activities of a Polysaccharide from Lepidium meyenii Leaves. Int. J. Biol. Macromol. 2017, 103, 1302–1310.

65. Li, J.; Sun, Q.; Meng, Q.; Wang, L.; Xiong, W.; Zhang, L. Anti-Fatigue Activity of Polysaccharide Fractions from Lepidium meyenii Walp. (Maca). Int. J. Biol. Macromol. 2017, 95, 1305–1311.

66. Tang, W.; Jin, L.; Xie, L.; Huang, J.; Wang, N.; Chu, B.; Dai, X.; Liu, Y.; Wang, R.; Zhang, Y. Structural Characterization and Antifatigue Effect In Vivo of Maca (Lepidium meyenii Walp) Polysaccharide. J. Food Sci. 2017, 82, 757–764.

67. Liao, C.Y.; Lee, C.C.; Tsai, C.C.; Hsueh, C.W.; Wang, C.C.; Chen, I.H.; Tsai, M.K.; Liu, M.Y.; Hsieh, A.T.; Su, K.J.; et al. Novel Investigations of Flavonoids as Chemopreventive Agents for Hepatocellular Carcinoma. BioMed Res. Int. 2015, 2015.

68. Zhang, L.; Zhao, Q.; Wang, L.; Zhao, M.; Zhao, B. Protective Effect of Polysaccharide from Maca (Lepidium meyenii) on Hep-G2 Cells and Alcoholic Liver Oxidative Injury in Mice. Int. J. Biol. Macromol. 2017, 99, 63–70.

69. Valentová, K.; Stejskal, D.; Bartek, J.; Dvořáčková, S.; Křen, V.; Ulrichová, J.; Šimánek, V. Maca (Lepidium meyenii) and Yacon (Smallanthus sonchifolius) in Combination with Silymarin as Food Supplements: In Vivo Safety Assessment. Food Chem. Toxicol. 2008, 46, 1006–1013.

70. Variya, B.C.; Bakrania, A.K.; Patel, S.S. Emblica officinalis (Amla): A Review for Its Phytochemistry, Ethnomedicinal Uses and Medicinal Potentials with Respect to Molecular Mechanisms. Pharmacol. Res. 2016, 111, 180–200.

71. Pardeshi, S.; Dhodapkar, R.; Kumar, A. Molecularly Imprinted Microspheres and Nanoparticles Prepared Using Precipitation Polymerisation Method for Selective Extraction of Gallic Acid from Emblica officinalis. Food Chem. 2014, 146, 385–393.

72. Baliga, M.S.; Dsouza, J.J. Amla (Emblica officinalis Gaertn), a Wonder Berry in the Treatment and Prevention of Cancer. Eur. J. Cancer Prev. 2011, 20, 225–239.

73. Tarwadi, K.; Agte, V. Antioxidant and Micronutrient Potential of Common Fruits Available in the Indian Subcontinent. Int. J. Food Sci. Nutr. 2007, 58, 341–349.

74. Hasan, M.R.; Islam, M.N.; Islam, M.R. Phytochemistry, Pharmacological Activities and Traditional Uses of Emblica officinalis: A Review. Int. Curr. Pharm. J. 2016, 5, 14–21.

75. Jain, S.K.; Khurdiya, D.S. Vitamin C Enrichment of Fruit Juice Based Ready-to-Serve Beverages through Blending of Indian Gooseberry (Emblica officinalis Gaertn.) Juice. Plant Foods Hum. Nutr. 2004, 59, 63–66.

76. Bansal, V.; Sharma, A.; Ghanshyam, C.; Singla, M.L. Coupling of Chromatographic Analyses with Pretreatment for the Determination of Bioactive Compounds in Emblica officinalis Juice. Anal Methods 2014, 6, 410–418.

77. Yang, F.; Yaseen, A.; Chen, B.; Li, F.; Wang, L.; Hu, W.; Wang, M. Chemical Constituents from the Fruits of Phyllanthus emblica L. Biochem Syst. Ecol. 2020, 92, 104122.

78. Ur-Rehman, H.; Yasin, K.A.; Choudhary, M.A.; Khaliq, N.; Ur-Rahman, A.; Choudhary, M.I.; Malik, S. Studies on the Chemical Constituents of Phyllanthus emblica. Nat. Prod. Res. 2007, 21, 775–781.

79. Krishnaveni, M.; Mirunalini, S. Therapeutic Potential of Phyllanthus emblica (Amla): The Ayurvedic Wonder. J. Basic Clin. Physiol. Pharmacol. 2010, 21, 93–105.

80. Patel, S.S.; Goyal, R.K. Emblica officinalis Geart.: A Comprehensive Review on Phytochemistry, Pharmacology and Ethnomedicinal Uses. Res. J. Med. Plant 2012, 6, 6–16.

81. Akhtar, M.S.; Ramzan, A.; Ali, A.; Ahmad, M. Effect of Amla Fruit (Emblica officinalis Gaertn.) on Blood Glucose and Lipid Profile of Normal Subjects and Type 2 Diabetic Patients. Int. J. Food Sci. Nutr. 2011, 62, 609–616.

82. Mehta, S.; Singh, R.K.; Jaiswal, D.; Rai, P.K.; Watal, G. Anti-Diabetic Activity of Emblica officinalis in Animal Models. Pharm. Biol. 2009, 47, 1050–1055.

83. D'Souza, J.; D'Souza, P.; Arnadi Ramachandrayya, S.; Mathai, R.; Jimmy, R.; Palatty, P.; Ravi, R.; Simon, P.; Baliga, S. Cardioprotective Effects of Indian Gooseberry (Emblica officinalis Gaertn) and Its Phytochemicals: A Review. Curr. Nutr. Food Sci. 2014, 10, 141–149.

84. Kaur, S.; Michael, H.; Arora, S.; Härkönen, P.L.; Kumar, S. The in Vitro Cytotoxic and Apoptotic Activity of Triphala—An Indian Herbal Drug. J. Ethnopharmacol. 2005, 97, 15–20.

85. Mahata, S.; Pandey, A.; Shukla, S.; Tyagi, A.; Husain, S.A.; Das, B.C.; Bharti, A.C. Anticancer Activity of Phyllanthus Emblica Linn. (Indian Gooseberry): Inhibition of Transcription Factor Ap-1 and HPV Gene Expression in Cervical Cancer Cells. Nutr. Cancer 2013, 65, 88–97.

86. Al Kanhal, H.A. Compositional, technological and nutritional aspects of dromedary camel milk. Int. Dairy J. 2010, 20, 811–821.

87. Yaqoob, M.; Nawaz, H. Potential of Pakistani Camel for Dairy and Other Uses. Anim. Sci. J. 2007, 78, 467–475.

88. Salami, M.; Yousefi, R.; Ehsani, M.R.; Razavi, S.H.; Chobert, J.M.; Haertlé, T.; Saboury, A.A.; Atri, M.S.; Niasari-Naslaji, A.; Ahmad, F.; et al. Enzymatic Digestion and Antioxidant Activity of the Native and Molten Globule States of Camel α-Lactalbumin: Possible Significance for Use in Infant Formula. Int. Dairy J. 2009, 19, 518–523.

89. Bai, Y.H.; Zhao, D.B. The Acid-Base Buffering Properties of Alxa Bactrian Camel Milk. Small Rumin. Res. 2015, 123, 287–292.

90. Ahamad, S.R.; Raish, M.; Ahmad, A.; Shakeel, F. Potential Health Benefits and Metabolomics of Camel Milk by GC-MS and ICP-MS. Biol. Trace Elem. Res. 2017, 175, 322–330.

91. Konuspayeva, G.; Faye, B.; Loiseau, G. The Composition of Camel Milk: A Meta-Analysis of the Literature Data. J. Food Compost. Anal. 2009, 22, 95–101.

92. Zhao, D.B.; Bai, Y.H.; Niu, Y.W. Composition and Characteristics of Chinese Bactrian Camel Milk. Small Rumin. Res. 2015, 127, 58–67.

93. Khalesi, M.; Salami, M.; Moslehishad, M.; Winterburn, J.; Moosavi-Movahedi, A.A. Biomolecular Content of Camel Milk: A Traditional Superfood towards Future Healthcare Industry. Trends Food Sci. Tech. 2017, 62, 49–58.

94. Al-Ashqar, R.A.; Al-Mohammad Salem, K.M.; Al Herz, A.K.M.; Al-Haroon, A.I.; Alluwaimi, A.M. The CD Markers of Camel (Camelus dromedarius) Milk Cells during Mastitis: The LPAM-1 Expression Is an Indication of Possible Mucosal Nature of the Cellular Trafficking. Res. Vet. Sci. 2015, 99, 77–81.

95. Shuiep, E.T.S.; Giambra, I.J.; el Zubeir, I.E.Y.M.; Erhardt, G. Biochemical and Molecular Characterization of Polymorphisms of As1-Casein in Sudanese Camel (Camelus dromedarius) Milk. Int. Dairy J. 2013, 28, 88–93.

96. Korish, A.A.; Abdel Gader, A.G.; Korashy, H.M.; Al-Drees, A.M.; Alhaider, A.A.; Arafah, M.M. Camel Milk Attenuates the Biochemical and Morphological Features of Diabetic Nephropathy: Inhibition of Smad1 and Collagen Type IV Synthesis. Chem. Biol. Interact. 2015, 229, 100–108.

97. Mehaia, M.A.; Hablas, M.A.; Abdel-Rahman, K.M.; El-Mougy, S.A. Milk Composition of Majaheim, Wadah and Hamra Camels in Saudi Arabia. Food Chem. 1995, 52, 115–122.

98. Singh, R.; Mal, G.; Kumar, D.; Patil, N.V.; Pathak, K.M.L. Camel Milk: An Important Natural Adjuvant. Agric. Res. 2017, 6, 327–340.

99. Assaf, R.; Ruppanneb, R. Antibacterial and Antiviral Activity of Camel Milk Protective Proteins. J. Dairy Res. 1992, 59, 169–175.

100. Mal, G.; Sena, D.S.; Jain, V.K.; Sahani, M.S. Therapeutic Value of Camel Milk as a Nutritional Supplement for Multiple Drug Resistant (MDR) Tuberculosis Patients. Isr. J. Vet. Med. 2006, 61, 88–91.

101. Beg, O.U.; von Bahr-Lindström, H.; Zaidi, Z.H.; Jörnvall, H. A Camel Milk Whey Protein Rich in Half-Cystine. Eur. J. Biochem. 1986, 159, 195–201.

102. Agrawal, R.; Saran, S.; Sharma, P.; Gupta, R.; Kochar, D.; Sahani, M. Effect of Camel Milk on Residual β-Cell Function in Recent Onset Type 1 Diabetes. Diabetes Res. Clin. Pract. 2007, 77, 494–495.

103. Agrawal, R.; Beniwal, R.; Kochar, D.; Tuteja, F.; Ghorui, S.; Sahani, M.S.; Sharma, S. Camel Milk as an Adjunct to Insulin Therapy Improves Long-Term Glycemic Control and Reduction in Doses of Insulin in Patients with Type-1 Diabetes: A 1 Year Randomized Controlled Trial. Diabetes Res. Clin. Pract. 2005, 68, 176–177.

104. El-Agamy, E.I.; Nawar, M.; Shamsia, S.M.; Awad, S.; Haenlein, G.F.W. Are Camel Milk Proteins Convenient to the Nutrition of Cow Milk Allergic Children? Small Rumin. Res. 2009, 82, 1–6.

105. Swami, S.B.; Thakor, N.J.; Haldankar, P.M.; Kalse, S.B. Jackfruit and Its Many Functional Components as Related to Human Health: A Review. Compr. Rev. Food Sci. Food Saf. 2012, 11, 565–576.

106. Ranasinghe, R.A.S.N.; Maduwanthi, S.D.T.; Marapana, R.A.U.J. Nutritional and Health Benefits of Jackfruit (Artocarpus Heterophyllus Lam.): A Review. Int. J. Food Sci. 2019, 2019.

107. Baliga, M.S.; Shivashankara, A.R.; Haniadka, R.; Dsouza, J.; Bhat, H.P. Phytochemistry, Nutritional and Pharmacological Properties of Artocarpus heterophyllus Lam (Jackfruit): A Review. Food Res. Int. 2011, 44, 1800–1811.

108. Goswami, C.; Chacrabati, R. Chapter 14—Jackfruit (Artocarpus heterophylus). In Nutritional Composition of Fruit Cultivars; Simmonds, M.S.J., Preedy, V.R., Eds.; Academic Press: San Diego, CA, USA, 2016; pp. 317–335. ISBN 978-0-12-408117-8.

109. Mukprasirt, A.; Sajjaanantakul, K. Physico-Chemical Properties of Flour and Starch from Jackfruit Seeds (Artocarpus heterophyllus Lam.) Compared with Modified Starches. Int. J. Food Sci. Tech. 2004, 39, 271–276.

110. Jagtap, U.B.; Panaskar, S.N.; Bapat, V.A. Evaluation of Antioxidant Capacity and Phenol Content in Jackfruit (Artocarpus heterophyllus Lam.) Fruit Pulp. Plant Foods Hum. Nutr. 2010, 65, 99–104.

111. De Faria, A.F.; de Rosso, V.V.; Mercadante, A.Z. Carotenoid Composition of Jackfruit (Artocarpus heterophyllus), Determined by HPLC-PDA-MS/MS. Plant Foods Hum. Nutr. 2009, 64, 108–115.

112. Fernando, M.R.; Wickramasinghe, S.M.D.N.; Thabrew, M.I.; Ariyananda, P.L.; Karunanayake, E.H. Effect of Artocarpus heterophyllus and Asteracanthus longifolia on Glucose Tolerance in Normal Human Subjects and in Maturity-Onset Diabetic Patients. J. Ethnopharmacol. 1991, 31, 277–282.

113. Teixeira, S.; Luís, I.M.; Oliveira, M.M.; Abreu, I.A.; Batista, R. Goji Berries Superfood–Contributions for the Characterisation of Proteome and IgE-Binding Proteins. Food Agric. Immunol. 2019, 30, 262–280.

114. Donno, D.; Beccaro, G.L.; Mellano, M.G.; Cerutti, A.K.; Bounous, G. Goji Berry Fruit (Lycium Spp.): Antioxidant Compound Fingerprint and Bioactivity Evaluation. J. Funct. Foods 2015, 18, 1070–1085.

115. Kulczyński, B.; Gramza-Michałowska, A. Goji Berry (Lycium barbarum): Composition and Health Effects—A Review. Pol. J. Food Nutr. Sci. 2016, 66, 67–75.

116. Amagase, H.; Nance, D.M. Lycium Barbarum Increases Caloric Expenditure and Decreases Waist Circumference in Healthy Overweight Men and Women: Pilot Study. J. Am. Coll. Nutr. 2011, 30, 304–309.

117. Ma, Z.F.; Zhang, H.; Teh, S.S.; Wang, C.W.; Zhang, Y.; Hayford, F.; Wang, L.; Ma, T.; Dong, Z.; Zhang, Y.; et al. Goji Berries as a Potential Natural Antioxidant Medicine: An Insight into Their Molecular Mechanisms of Action. Oxidative Med. Cell. Longev. 2019, 2019.

118. Amagase, H.; Farnsworth, N.R. A Review of Botanical Characteristics, Phytochemistry, Clinical Relevance in Efficacy and Safety of Lycium barbarum Fruit (Goji). Food Res. Int. 2011, 44, 1702–1717.

119. Luo, Q.; Cai, Y.; Yan, J.; Sun, M.; Corke, H. Hypoglycemic and Hypolipidemic Effects and Antioxidant Activity of Fruit Extracts from Lycium barbarum. Life Sci. 2004, 76, 137–149.

120. Blasi, F.; Montesano, D.; Simonetti, M.S.; Cossignani, L. A Simple and Rapid Extraction Method to Evaluate the Fatty Acid Composition and Nutritional Value of Goji Berry Lipid. Food Anal. Methods 2017, 10, 970–979.

121. Niro, S.; Fratianni, A.; Panfili, G.; Falasca, L.; Cinquanta, L.; Alam, M. Nutritional Evaluation of Fresh and Dried Goji Berries Cultivated in Italy. Ital. J. Food Sci. 2017, 29, 398–408.

122. Chang, S.K.; Alasalvar, C.; Shahidi, F. Superfruits: Phytochemicals, Antioxidant Efficacies, and Health Effects—A Comprehensive Review. Crit. Rev. Food Sci. Nutr. 2019, 59, 1580–1604.

123. Potterat, O. Goji (Lycium barbarum and L. chinense): Phytochemistry, Pharmacology and Safety in the Perspective of Traditional Uses and Recent Popularity. Planta Med. 2010, 76, 7–19.

124. Wang, C.C.; Chang, S.C.; Inbaraj, B.S.; Chen, B.H. Isolation of Carotenoids, Flavonoids and Polysaccharides from Lycium barbarum L. and Evaluation of Antioxidant Activity. Food Chem. 2010, 120, 184–192.

125. Llorent-Martínez, E.J.; Fernández-de Córdova, M.L.; Ortega-Barrales, P.; Ruiz-Medina, A. Characterization and Comparison of the Chemical Composition of Exotic Superfoods. Microchem. J. 2013, 110, 444–451.

126. Mikulic-Petkovsek, M.; Schmitzer, V.; Slatnar, A.; Stampar, F.; Veberic, R. Composition of Sugars, Organic Acids, and Total Phenolics in 25 Wild or Cultivated Berry Species. J. Food Sci. 2012, 77, 1–7.

127. Hsu, H.J.; Huang, R.F.; Kao, T.H.; Inbaraj, B.S.; Chen, B.H. Preparation of Carotenoid Extracts and Nanoemulsions from Lycium barbarum L. and Their Effects on Growth of HT-29 Colon Cancer Cells. Nanotechnology 2017, 28, 135103.

128. Jin, M.; Huang, Q.; Zhao, K.; Shang, P. Biological Activities and Potential Health Benefit Effects of Polysaccharides Isolated from Lycium barbarum L. Int. J. Biol. Macromol. 2013, 54, 16–23.

129. Gao, Y.; Wei, Y.; Wang, Y.; Gao, F.; Chen, Z. Lycium barbarum: A Traditional Chinese Herb and a Promising Anti-Aging Agent. Aging Dis. 2017, 8, 778–791.

130. Patrick, L. Selenium Biochemistry and Cancer: A Review of the Literature. Altern. Med. Rev. 2004, 9, 239–258.

131. Dunn, B.K.; Ryan, A.; Ford, L.G. Seleneium and Vitamin E Cancer Prevention Trial: A Nutrient Approach to Prostate Cancer Prevention. In Proceedings of the Cancer Prevention II; Senn, H.-J., Kapp, U., Otto, F., Eds.; Springer: Berlin/Heidelberg, Germany, 2009; pp. 183–193.

132. Ip, C.; Lisk, D.J. Bioactivity of Selenium from Brazil Nut for Cancer Prevention and Selenoenzyme Maintenance. Nutr. Cancer 1994, 21, 203–212.

133. Thomson, C.D.; Chisholm, A.; McLachlan, S.K.; Campbell, J.M. Brazil Nuts: An Effective Way to Improve Selenium Status. Am. J. Clin. Nutr. 2008, 87, 379–384.

134. Macan, T.P.; de Amorim, T.A.; Damiani, A.P.; Beretta, Â.C.D.L.; Magenis, M.L.; Vilela, T.C.; Teixeira, J.P.; Andrade, V.M.D. Brazil Nut Prevents Oxidative DNA Damage in Type 2 Diabetes Patients. Drug Chem. Toxicol. 2020, 1–7.

135. Colpo, E.; Vilanova, C.D.D.; Reetz, L.G.B.; Duarte, M.M.; Farias, I.L.G.; Meinerz, D.F.; Mariano, D.O.; Vendrusculo, R.G.; Boligon, A.A.; Dalla Corte, C.L.; et al. Brazilian Nut Consumption by Healthy Volunteers Improves Inflammatory Parameters. Nutrition 2014, 30, 459–465.

136. Prociuk, M.A.; Edel, A.L.; Richard, M.N.; Gavel, N.T.; Ander, B.P.; Dupasquier, C.M.C.; Pierce, G.N. Cholesterol-induced stimulation of platelet aggregation is prevented by a hempseed-enriched diet. Can. J. Physiol. Pharmacol. 2008, 86, 153–159.

137. Al-Khalifa, A.; Maddaford, T.G.; Chahine, M.N.; Austria, J.A.; Edel, A.L.; Richard, M.N.; Ander, B.P.; Gavel, N.; Kopilas, M.; Ganguly, R.; et al. Effect of Dietary Hempseed Intake on Cardiac Ischemia-Reperfusion Injury. Am. J. Physiol. Integr. Comp. Physiol. 2007, 292, R1198–R1203.

138. Zhou, Y.; Wang, S.; Ji, J.; Lou, H.; Fan, P. Hemp (Cannabis sativa L.) Seed Phenylpropionamides Composition and Effects on Memory Dysfunction and Biomarkers of Neuroinflammation Induced by Lipopolysaccharide in Mice. ACS Omega 2018, 3, 15988–15995.

139. Schwab, U.S.; Callaway, J.C.; Erkkilä, A.T.; Gynther, J.; Uusitupa, M.I.J.; Jarvinen, T. Effects of Hempseed and Flaxseed Oils on the Profile of Serum Lipids, Serum Total and Lipoprotein Lipid Concentrations and Haemostatic Factors. Eur. J. Nutr. 2006, 45, 470.

140. Ghante, M.H.; Badole, S.L.; Bodhankar, S.L. Chapter 62—Health Benefits of Garden Cress (Lepidium sativum Linn.) Seed Extracts. In Nuts and Seeds in Health and Disease Prevention; Preedy, V.R., Watson, R.R., Patel, V.B., Eds.; Academic Press: San Diego, CA, USA, 2011; pp. 521–525. ISBN 978-0-12-375688-6.

141. Al-Yahya, M.A.; Mossa, J.S.; Ageel, A.M.; Rafatullah, S. Pharmacological and Safety Evaluation Studies on Lepidium sativum L., Seeds. Phytomedicine 1994, 1, 155–159.

142. Mahassni, S.H.; Al-Reemi, R.M. Apoptosis and Necrosis of Human Breast Cancer Cells by an Aqueous Extract of Garden Cress (Lepidium sativum) Seeds. Saudi J. Biol. Sci. 2013, 20, 131–139.

143. Li, Y.; Xu, F.; Zheng, M.; Xi, X.; Cui, X.; Han, C. Maca Polysaccharides: A Review of Compositions, Isolation, Therapeutics and Prospects. Int. J. Biol. Macromol. 2018, 111, 894–902.

144. Wang, W.; Zou, Y.; Li, Q.; Mao, R.; Shao, X.; Jin, D.; Zheng, D.; Zhao, T.; Zhu, H.; Zhang, L.; et al. Immunomodulatory Effects of a Polysaccharide Purified from Lepidium meyenii Walp. on Macrophages. Process Biochem. 2016, 51, 542–553.

145. Guo, S.-S.; Gao, X.-F.; Gu, Y.-R.; Wan, Z.-X.; Lu, A.-M.; Qin, Z.-H.; Luo, L. Preservation of Cognitive Function by Lepidium meyenii (Maca) Is Associated with Improvement of Mitochondrial Activity and Upregulation of Autophagy-Related Proteins in Middle-Aged Mouse Cortex. Evid. Based Complement. Altern. Med. 2016, 2016, 4394261.

146. Shin, B.C.; Lee, M.S.; Yang, E.J.; Lim, H.S.; Ernst, E. Maca (L. meyenii) for Improving Sexual Function: A Systematic Review. BMC Complement. Altern. Med. 2010, 10, 44.

147. Kim, H.J.; Yokozawa, T.; Kim, H.Y.; Tohda, C.; Rao, T.P.; Juneja, L.R. Influence of Amla (Emblica officinalis Gaertn.) on Hypercholesterolemia and Lipid Peroxidation in Cholesterol-Fed Rats. J. Nutr. Sci. Vitaminol. 2005, 51, 413–418.

148. Augusti, K.T.; Arathy, S.L.; Asha, R.; Ramakrishanan, J.; Zaira, J.; Lekha, V.; Smitha, S.; Vijayasree, V.M. A Comparative Study on the Beneficial Effects of Garlic (Allium sativum Linn), Amla (Emblica officinalis Gaertn) and Onion (Allium cepa Linn) on the Hyperlipidemia Induced by Butter Fat and Beef Fat in Rats. Indian J. Exp. Biol. 2001, 39, 760–766.

149. Banu, S.M.; Selvendiran, K.; Singh, J.P.V.; Sakthisekaran, D. Protective Effect of Emblica Officinalis Ethanolic Extract against 7,12-Dimethylbenz(a)Anthracene (DMBA) Induced Genotoxicity in Swiss Albino Mice. Hum. Exp. Toxicol. 2004, 23, 527–531.

150. Kaur, S.; Arora, S.; Kaur, K.; Kumar, S. The in Vitro Antimutagenic Activity of Triphala—An Indian Herbal Drug. Food Chem. Toxicol. 2002, 40, 527–534.

151. Agrawal, R.P.; Jain, S.; Shah, S.; Chopra, A.; Agarwal, V. Effect of Camel Milk on Glycemic Control and Insulin Requirement in Patients with Type 1 Diabetes: 2-Years Randomized Controlled Trial. Eur. J. Clin. Nutr. 2011, 65, 1048–1052.

152. Yagil, R. Camel Milk and Its Unique Anti-Diarrheal Properties. Isr. Med. Assoc. J. 2013, 15, 35–36.