The Pharma Innovation Journal 2022; SP-11(6): 1004-1011

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(6): 1004-1011

www.thepharmajournal.com
Received: 08-03-2022
Accepted: 12-04-2022

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Potential sources of butter and their significance: A review

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Abstract
The food industry today is returning to natural foods after emphasizing processed products due to the higher consumer demand for foods, which are well recognized for healthy nutrients. Butter is a water-in-oil emulsion with a minimum fat content of 80%, in which water content should not exceed 16% and non-fat milk solids generally constitute 2%. Butter from animal sources is reported to have side effects in terms of increasing the level of bad cholesterol. Plant-based butter from various sources *viz*. Peanut, cashew nut, sunflower, etc. are considered healthy alternatives. Additionally, bee pollen is regarded as the best quality protein source not only because of its nutritional qualities but also because of its well-liked flavor. Bee pollen is known as a natural superfood due to its indispensable nutritional and medicinal properties. The current study, therefore, presents an updated overview of Potential sources of butter and its significance.

Keywords: Bee pollen, characterization, bee, pollen, bee pollen butter, food industry, utilization

Introduction
Butter is a solid, high-fat food usually made from cow's milk. It can also be produced from the milk of goats, sheep, or buffalo (Abdel-Rahman., MK. 2016). Butter could be developed by churning or shaking cream until it separates into solids and liquid parts called butterfat and buttermilk, respectively (Baile RP, 2017). The cream is used because it's higher in fat than milk, thus producing more butter (Connick FC, 2007). Butter contains around 80% fat and only trace amounts of carbohydrates and protein (Thakur M, 2013). Additionally, butterfat is also high in calories. Anything made from the milk of mammals is considered dairy and butter is considered a dairy product (G. Kroyer, 2015). Different types of butter available in the market have been shown in figure 1.

Considering the several disadvantages of dairy butter with respect to health, people are now shifting towards plant-based butter, which is a rich source of several nutrients (M. Polanski, 2009). Plant-based butter also referred to as vegan butter, is a non-dairy butter substitute that's typically made by combining water with a plant-derived oil, such as olive, avocado, coconut, palm kernel oil, or a combination of oils (Purves ER, 2011). These products often contain additional ingredients, such as salt, emulsifiers, colouring's, and natural or artificial flavours, to more closely resemble the taste and texture of real butter (Adhikary., M. (2011). While it may seem similar to margarine, the main difference is that margarine may still contain small amounts of dairy, whereas plant-based butter is free of animal products (S. Juzwiak, 2019).

Bee pollen is known as an apitherapeutic product because it contains groups of chemical compounds that are made by bees and used for medicinal purposes (Kostić *et al*., 2020). In its composition, there are about 250 substances, including amino acids, lipids, vitamins, macro- and micronutrients, and flavonoids (Steven, 2014). Currently, many countries like Brazil, Bulgaria, Poland, and Switzerland have established bee pollen guidelines regarding the physical, chemical, and microbiological standards to make it theme able for human consumption (Saavedra *et al*., 2013). However, there are no official figures about the world's commercial production of bee-collected pollen, but the production of pollen is the greatest among the secondary bee products (all besides honey). China is considered the leading producer and exporter of bee pollen in the world; it produces at present about 2500 tons per year (Contessi, 2009). Still, India is lacking in its production. In the Indian market, honey and beeswax are the only two products from beekeeping (Barth *et al*., 2010). According to Dr. Swami Naththe, the second green revolution is possible only by increasing the number of pollinators, such as honey bees, thanks to honey production and pollination (Silveira, 2012) Major regions for beekeeping activities in India include Punjab, Jammu-Kashmir, Himachal

Pradesh, Uttar Pradesh, Haryana, Bihar, and West Bengal (Thomas *et al*., 2002; More *et al*., 2010). These parts of the country are home to diverse flora of nectariferous and polliniferous plant species, which are central conditions of apiculture producing high-quality pollen (Liolios *et al*., 2018). However, this is very pitiful that the systemic investigation examining the composition or benefits of bee pollen from Indian sources is scanty and no work was found about exploring the potential of Indian bee pollen in the food sector. Keeping in mind all these consequences, the present study is, therefore planned on potential sources of butter and their utilization.

Dairy butter

Butter is a water-in-oil emulsion with a minimum fat content of 80%, in which water content should not exceed 16% and non-fat milk solids generally constitute 2%. There is a substantial annual consumption of butter worldwide and world production of butter is as high as 4.1 million tons per annum (Mortensen, 2011) Butter, the word derived from bou-Tyron (cow cheese) in Greek and used about 2,000 years before Christ (www. webexhibits.org/). Dairy butter is a water-in-oil emulsion, i.e. >80% fat with tiny water droplets, perhaps some solids-not-fat (SNF) and with/without salt (www.foodsci. uoguelph.ca/). However, animal foods such as butter are rich in saturated fat. Butter is a water-in-oil emulsion resulting from an inversion of the cream, where the milk proteins are the emulsifiers. Butter remains a firm solid when refrigerated, but softens to a spreadable consistency at room temperature, and melts to a thin liquid consistency at 32 to 35 °C (90 to 95 °F). The density of butter is 911 grams per liter (0.950 lb per US pint). It generally has a pale yellow color but varies from deep yellow to nearly white. Its natural, unmodified color is dependent on the source animal's feed and genetics, but the commercial manufacturing process commonly manipulates the color with food colorings like annatto or carotene. Butter with and without salt contains 55±2 g/100 g of saturated fat and 222±2 mg/100 g cholesterol (Scherr and Ribeiro 2011) reduced by 27% in those who ate nuts five or more times per week compared with those who rarely or never ate nuts. Raw nuts have primarily one of the two unsaturated types (except coconut and palm kernels), thus leading healthful source of fatty acids for the production of lower cholesterol level foods (www.rejuvenative.com/). At present different plant-based kinds of butter/spreads are available in the market. To name, peanut, almond, cashew, pumpkin seed, pistachio, soy, sunflower, and sesame butter are a few. The term plant-based (Nut/Seed) butter refers to a product that contains at least 90% nut/seed ingredients whereas, the spread refers to a spreadable product having at least 40% nut ingredients that can be added in various forms, e.g. as nuts, a paste and/or a slurry (Wilkes 2012). Varied types of product developed by using dairy butter has been shown in figure 2.

Plant-based butter

Plant sources *viz*. peanut, cashew nut; sunflower, etc. are popularly used for developing plant-based butter (Table 1). Plant-based butter and its significance have discussed below.

Peanut butter

Peanut (*Arachis hypogaea*) butter is creamy and composed of peanut paste and stabilizer. It may also contain sweetener, salt, emulsifier, and other ingredients. Peanut butter is prepared by roasting, blanching, grinding, and tempering. Good quality nuts and seed pods are sorted out and destoned before shelling. Shelled nuts are graded to ensure the sound, bold, or even size nuts. Roasting is a dry heat treatment, carried out not so much for dehydration but for flavor, color, and texture development (Alamprese *et al*. 2009) [8]. Roasting involves nuseveralsico-chemical changes including dehydration and chemical reactions. However, the development of flavor and aroma depends upon the temperature and time of roasting best besides the type of nuts and techniques applied (Shakerardekani *et al*. 2011). Generally, for peanut butter, roasting is done at around 160 °C for 40–60 min depending upon the seed size and moisture contents (Pattee *et al*. 2013). Roasting reduces water contents to around 1% followed by the release of oil from the cytoplasm of the cells, which increases the shelf life of peanuts and helps in developing the flavor of peanut butter (mofpi.nic.in). (Ogunsanwo *et al*. 2005) reported that the peanut butter prepared by roasting at 160 °C for 30 min was found comparable with the commercial samples. Blanching of peanuts is done to remove the skin of the peanut. There are several blanching methods including dry, water, spin, and air impact. Dry blanching is used primarily in peanut butter production, as it removes the kernel hearts, which affect peanut butter flavor (www.foodtechinfo.com/). After removing the outer skin during blanching, nuts are ground into a paste. Peanut butter is usually made by two-stage grinding operations. First grinding reduces the nuts to a medium size and the second milling uses a high-speed grinder cum mixer that has a combination of cutting-shearing and attrition action and reduces them to a fine (less than 0.025 cm) smooth texture (Industrial Extension Bureau). Due to these several passes, the paste is subjected to excessively high temperatures, and elaborative cooling methods need to be utilized to retain desired flavors in the nut butter. Patent by Connick (2010) states that accomplishing the grinding steps in the presence of solid carbon dioxide inhibits the dissolving, occlusion, and adsorption of free oxygen into the peanut butter and thereby increases the shelf life as well improves the flavor (Woodroof, 2011). Classified peanut butter into three types based on the texture *viz*., Smooth (even texture with no perceptible grainy peanut particles), Regular (definitely grainy texture with perceptible peanut particles not more than 1/16 in. in diameter and Chunky (partially fine and partially grainy particles with substantial amounts larger than 1/16 in. in diameter) (Crippen *et al*. 2008) reported that increased grind size (fine, medium and concourse decreased the sensory smoothness, spread ability, adhesiveness and preference ratings. According to (Dzurik *et al*. 2009) the high-pressure homogenization after initial grinding produces a paste of smooth, glossy, and melts more rapidly in the mouth than conventional peanut butter. During grinding, the ingredients

like salt, sugar, stabilizers, and emulsifiers are added. The addition of salt (< 1.2%) increased the ease of swallowing, as well as consumer preference for texture. Before grinding, nut/seeds, carbohydrates, protein, and other non-fat components will be in a continuous phase. Fat cells entrapped in non-fat components will be in a discontinuous phase.

Cashew butter

Cashew (*Anacardium occidentale*) plays an important role among tropical nuts, as an edible nut and is a principal industrialized product too (Chandrasekara and Shahidi 2011). Nagaraja (2003) prepared sweetened and flavored spread from cashew kernel baby bits (CKBB). Among the sweetened spreads prepared with different flavors, the cardamom spread was the most preferred. Defatting of CKBB did not affect the organoleptic acceptability of the spread (Lima *et al*. (2012) prepared cashew butter by roasting nuts immersed in vegetable oil at 140 °C for 3-4 min. Kernels (89.9 g/100 g), were ground with the other ingredients (refined cane sugar (8.0 g/100 g), soybean lecithin (2.0 g/100 g), and sodium chloride salt (0.1 g/100 g)) for 5 min in a food processor with the use of a stainless steel cutter. Different grades of kernels (Butts (B), kernels which are broken crosswise and are less than 7/8, but not less than 3/8 of a whole kernel, and whose cotyledons are still naturally attached; Splits (S), one half of a cashew kernel that has been split lengthwise, provided that no more than 1/8 of this cotyledon has been broken off; Pieces (P), pieces passing through sieve number 22 (8.00 mm opening) and retained on sieve number 4 (4.75 mm opening); Small pieces (SP), pieces passing through sieve number 4 (4.75 mm opening) and retained on sieve number 7 (2.80 mm opening); Special small pieces (SSP), pieces passing through sieve number 7 (2.80 mm opening) and retained on sieve number 8 (2.36 mm opening); Granules (G), pieces passing through sieve number 8 (2.36 mm opening) and retained on sieve number 10 (1.70 mm opening)) were tested for best quality butter and reported that the butter made from B (butts), S (splits) and P (pieces) kernel grades were of better quality.

Sunflower butter

Sunflower (*Helianthus annuus*) seed butter has more monounsaturated fat, magnesium, phosphorus, zinc, copper, iron, manganese, and vitamin E, Selenium, and less saturated fat than peanut butter (Thomas and Gebhardt 2010). However, sunflowers have a fibrous outer layer and associated moisture retention upon improper roasting. Nutritive properties of sunflower butter are equivalent to those of peanut butter and roasting conditions had a significant effect on the nutritional and sensory quality, color, and spread ability sunflower butter. Redness values represented by positive values were 1.6, 2.9, 3.3, and 2.9 for sunflower butter made with raw kernels, conventionally roasted, microwave roasted, and from a health food store respectively (Dreher *et al*. 2011). Acceptable color ranges for sunflower butter to be darker than most commercially prepared peanut butter (Falk and Holm 1981; Lima and Guraya 2005). The sunflower butter prepared by adding 7% sugar, 1.1% salt, 1.8% stabilizer, and a low roast level has been reported as best determined by sensory data (Lima and Guraya 2005).

Almond butter

Almond (*Prunus dulcis*) butter has significantly more fiber, calcium, and potassium than sunflower seed or peanut butter (Thomas and Gebhardt 2010) (Spiller *et al*. (2003) compared the lipid-altering effect of roasted salted almonds and roasted sesame (Kahyaoglu and Kaya 2006; Ciftci *et al*. 2008) (Kahyaoglu and Kaya, 2006) studied the effect of heating time (120 min) and temperatures (120, 150, and 180 °C) on moisture content, color, and texture of sesame seeds using conventional method optimized the processing of roasting at 155– 170 °C for 40–60 min for the production of sesame paste Besides color, the texture is another important control parameter for roasting. A faster moisture loss occurs as the roasting temperature increases. During roasting, sesame seeds become more crumble and brittle, which are typical characteristics of roasted products. (EI-Adawy and Mansour, 2005) reported that the tahina prepared by hot air roasting (130 °C for 1 h) and vacuum roasting (100 °C for 1 h) had higher panel scores than the steam roasted (100 °C for 3 h) and hot plate roasted (130 °C for 1 h) for the tested sensory properties. Although sesame paste is shelf-stable concerning chemical deteriorative reactions, its colloidal instability is the main problem during storage (Isa 2011). Both particle size and storage temperature had a significant effect on the sesame paste stability. Higher particle sized (mean particle size 129.11 μm) sesame paste lost stability at a higher rate than the smaller ones (mean particle size 14.23 μm). As the storage temperature was increased (20 to 40 °C), the colloidal stability of samples decreased due to the low viscosities of oil at high temperatures (Ciftci *et al*. 2008).

Pumpkin seed butter

Pumpkin (*Cucurbita maxima*) seeds, commonly known as ‘pepitas’, are flat, encased in a yellow-white husk (Amin and Thakur 2013; Abdel-Rahman 2006) [10]. Pumpkin seeds are nutritionally very good. They are a rich source of proteins, fatty acids, and minerals (Magnesium, Copper, and Zinc). Pumpkin seeds are rich not only in proteins but also a rich source of antioxidants vitamins such as carotenoids and tocopherols and minerals, and low in fats and calories (Amin and Thakur 2013) [10]. The nutritional value of pumpkin seeds is based on high protein content (25–51%) (Abdel-Rahman 2006) [1]. Pumpkin seeds could be utilized successfully as a good source of edible protein (320 g/kg) and oil (450 g/kg) for human consumption, as well as animal food; at the same time, it minimizes waste pollution (El-Soukkary 2001). Pumpkin seeds are a popular snack that is found hulled/semi-hulled (Amin and Thakur 2013) [10]. Recently the pumpkin seed butter has gained more popularity due to its high nutritional properties (Radocaj *et al*. 2011) optimized spread formulation from hull-less pumpkin seed oil press-cake. Hull-less pumpkin seed press-cake, a by-product of the pumpkin oil pressing process, was used to formulate a fat-based spread that resembled commercial peanut butter, both in appearance and in texture. The component’s content was optimized for

the minimum values of hardness and adhesiveness, with a target for maximum values of cohesiveness, with a stability of the spreads similar to peanut butter. Samples with 1.0% stabilizer/ 40% hemp oil content and 1.2% stabilizer 20% hemp oil content were closest to the instrumental texture of the peanut butter sample.

Bee pollen

Pollen is the microscopic structure present in the anther of the stamen in angiosperm, which constitutes the male reproductive cells of plants required for pollination and developing fruit (Basim *et al.*, 2015). During ancient times, people throughout the world commonly used pollen, praising it for its goodness and medicinal properties. To date, no scientific evidence has been cited to disprove the claimed properties of bee pollen. One claim attributes bee-pollen the ability to reduce the rate of aging. It is said that this product has a special factor that can improve health, and increase vital energy. The basis for this claim is the fact that the queen bee, and only the queen bee, can live five or six years on a diet of royal jelly, which the bees do with bee pollen. Other bees only eat this diet for the first two days of their life and after that, they eat honey. They live for only a few weeks. An undeniable fact is that this product cannot be synthesized in the laboratory, cannot be easily adulterated, and has been taken by people over thousands of years, without manipulation or recorded side effects. It is fortunate that several scientists, worldwide are earring out research in many different areas, of interest, to test and prove the nutritive and curative properties claimed for the bee pollen that we "steal" from the hive. Bees collect pollen from plant anthers, mix it with a small dose of the secretion from salivary glands or nectar, and place it in specific baskets called corbiculae that are situated on the tibia of their hind legs - called pollen loads (Silva, 2014). After the pollen is collected, it is brought to the hive where it's packed in honeycomb cells. Then the surface of the collected pollen is covered with a thin layer of honey and wax, creating "bee bread." Research shows that the beebread undergoes anaerobic fermentation and is preserved by the arising lactic acid. The beebread serves as the basic protein source for the bee colony (Nogueira, 2012). According to the latest national data, one bee colony gives one to seven kilograms of pollen a year. Each day, the amount of pollen collected from one-colony amounts to 50–250 grams (Almazar, 2004). There are special devices, or pollen traps, that are used to collect pollen baskets as field bees return to their hives. The bees must force their way through the traps to get into the hive, and they lose part of the pollen basket, sending them back out to collect more pollen (Kroyer, 2001) [36]. The color of the pollen varies, ranging from bright yellow to black. Bees usually collect pollen from the same plant, but they sometimes collect pollen from many different plant species. The pollen grains depend on the plant species; they differ in shape, color, size, and weight (Couto, 2006).

Bee pollen is a mixture of flower pollen, nectar, enzymes, honey, wax, and bee secretions. Bee pollen is denser in protein than any source from animals. The chemical constituents (sugars, amino acids, fatty acids, minerals, vitamins, and phenolic compounds) of bee pollen since 2009 from more than 20 nations of the world. Bee pollen can provide a much safer source of protein without the worry of high intakes of saturated fats (not to mention the numerous established links between animal proteins and cancer). Bee pollen is a concentrated source of the B vitamin complex – this provides energy. This is why bee pollen products are usually marketed as energy supplements or 'energizers' (Shubharani, 2013). Foraging honeybees collect pollen from plants and transport it to the beehive, where it is stored and used as food for the colony. Recently, bee pollen has gained traction in the health community because it is loaded with nutrients, amino acids, vitamins, lipids, and over 250 active substances. (Dubtsova, 2006). Bee pollen is a valuable apitherapeutic product greatly appreciated by consumers of natural medicine. Bee pollen is known for the potential it has for nutritional applications and the variable dietary benefits it gives. Bee pollen demonstrates a series of actions such as antifungal, antimicrobial, antiviral, anti-inflammatory, hepatoprotective, anticancer immuno stimulating, and local analgesia. The beneficial properties of bee pollen and the validity of their therapeutic use in various pathological conditions have been discussed by scientists, athletes, and health enthusiasts. (Campos, 2006). Bee pollen consists of the powdery substance that plants make to reproduce. The bees collect this on their legs and bodies and take it back to the hive as a food sour. (Campos, 2010) [18]. In addition to antioxidants, it contains vitamins and minerals, enzymes, protein, and carbohydrates. Once the bees return home with the pollen they collect, it is covered with a small amount of beeswax and honey by other bees (Holderna, 2005). This is called "bee bread," and it is the main protein source for the bees in the colony. Because the pollen grains are collected from many different types of plants, bee pollen varies in shape, colour, and nutritional content. Although bees normally collect pollen from just one type of plant at a time, sometimes they will gather it from many different flowers (Holderna, 2012). Since it's a natural product that is always different based on geographical location and flower type, it's hard to know exactly what's in the bee pollen you get. (Almeida and Muradian, 2005) [9]. Bee pollen is sold as natural granules you can measure out and take by spoonful. You can also mix it into other foods like granola or yogurt or make smoothies with it. It generally has a bitter taste, although people who take it regularly seem to get used to it. (Roulston, 2016). Bee Pollen the product of young honeybees and is considered one of nature's most completely nourishing foods. It contains nearly all nutrients required by humans. (Szczesna, 2009). Bee pollen contains the male reproductive cells of flowers. It also contains digestive enzymes from bees. Pollen is rich in vitamins, minerals, trace elements, enzymes, and amino acids. It's also a great source of antioxidants. (Asafova, 2018). Bee pollen contains vitamins, minerals, carbohydrates, lipids, and protein. It comes from the pollen that collects on the bodies of bees. Bee pollen may also include bee saliva. (Nagasimha, 2013).trients

Development of bee pollen butter

Following steps are being followed according to Anjan Borah (2022)

Step 1

Collect the fresh bee pollen, clean the impurities, and transfer the bee pollen to a bowl

Step 2

Grind the bee pollen pellets into fine powder with the help of mixer or pestle & mortar

Step 3

Sieve the powdered bee pollen into a clean bowl

Step 4

Mix the sieved bee pollen powder with grinded sugar for the taste and mix the composition well

Step 5

Add a tablespoon of oil to make the butter smooth.

Scrape down the sides with a spatula and blend for another minute or so until super-smooth.

Taste and add some sweetener, such as sugar or honey

Step 6

Keep bee pollen butter into a clean, airtight jar. Store at room temperature

Fig 1: Different types of butter

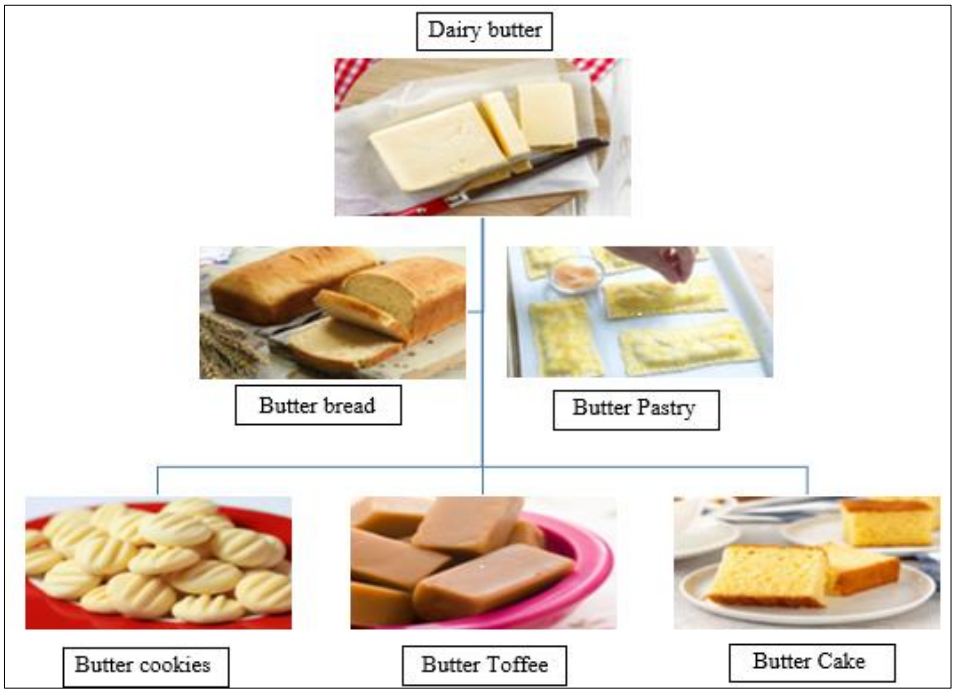

Fig 2: Different types of products from dairy butter

Table 1: Different Types of Plant-Based Butter and Its Nutritional Values

Type of butter	Almond butter	Cashew butter	Bee pollen butter	Peanut butter	Dairy butter	Sunflower seed butter
Serving Size	**100g**	**100g**	**100g**	**100g**	**100g**	**100g**
Macronutrients						
Calories (kcal)	614	587	348	588	717	617
Protein (g)	20.96 (42%)	17.56 (35%)	26.79	25.09 (50%)	0.85	17.28 (35%)
Total Fat (g)	55.50 (85%)	49.41 (76%)	50.20	50.39 (78%)	81.11	55.20 (85%)
Total Carbohydrates (g)	18.82	27.57	55	19.56	0.06	23.32
Dietary Fibre (g)	10.3 (41%)	2.0 (8%)	5.50%	6.0 (24%)	0	5.7 (23%)
Sugar (g)	4.43	-	10	9.22	0.06	10.54
Vitamins						
Vitamin C (mg)	0	0	25 mg	0	0	2.7 (5%)
Thiamine (mg)	0.041 (3%)	0.312 (21%)	0.055	0.073 (5%)	0.01	0.053 (4%)
Riboflavin (mg)	0.939 (55%)	0.187 (11%)	0.125	0.105 (6%)	0.03	0.163 (10%)
Niacin (mg)	3.155 (16%)	1.599 (8%)	3.2(17%)	13.403 (67%)	0.04	6.747 (34%)
Pantothenic Acid (mg)	0.318 (3%)	1.201 (12%)	0.40(3%)	1.060 (11%)	0.11	1.167 (12%)
Vitamin B6 (mg)	0.103 (5%)	0.252 (13%)	0.203(5%)	0.543 (27%)	0	0.550 (28%)
Folate (mcg)	53 (13%)	68 (17%)	0	74 (19%)	3	237 (59%)
Vitamin B12 (mcg)	0	0	0	0	0	0
Vitamin A (IU)	1	0	1.88	0	2499	52 (1%)
Vitamin E (mg)	24.21 (81%)	-	0	8.99 (30%)	2.32	22.89 (76%)
Vitamin K (mcg)	0	-	0	0.6 (1%)	7	
Minerals						
Calcium (mg)	347 (35%)	43 (4%)	4.0 mg	43 (4%)	24	64 (6%)
Iron (mg)	3.49 (19%)	5.03 (28%)	4.95	1.87 (10%)	0.02	4.12 (23%)
Magnesium (mg)	279 (70%)	258 (65%)	2.0 mg	154 (39%)	2	311 (78%)
Phosphorus (mg)	508 (51%)	457 (46%)	47.9 mg	358 (36%)	24	666 (67%)
Potassium (mg)	748 (21%)	546 (16%)	0	649 (19%)	24	576 (16%)
Sodium (mg)	7	15 (1%)	350	17 (1%)	643	3
Zinc (mg)	3.29 (22%)	5.16 (34%)	0	2.91 (19%)	0.09	4.89 (33%)
Copper (mg)	0.934 (47%)	2.190 (110%)	0	0.473 (24%)	0	1.597 (80%)
Manganese (mg)	2.131(107%)	0.815(47%)	0	1.466(76%)	0	2.073(104%)
Monounsaturated Fat (g)	32.445	29.122	23.713	18.127	51.37	39.025
Polyunsaturated Fat (g)	13.613	8.354	10.000	13.867	31.039	9.805

Table 2: Amino acid composition of bee pollen butter

Amino acids	Per serving	Per 100 g
Alanine (g)	0.75	2.43
Arginine (g)	1.26	4.06
Aspartic acid (g)	1.74	5.63
Cysteine (g)	0.27	0.86
Glutamic acid (g)	2.63	8.5
Glycine (g)	0.62	2.01
Histidine (g)	0.41	1.33
Isoleucine (g)	0.63	2.02
Leucine (g)	1.33	4.28
Lysine (g)	1.12	3.63
Methionine (g)	0.21	0.66
Phenylalanine (g)	0.81	2.61
Proline (g)	0.83	2.67
Serine (g)	0.79	2.55
Threonine (g)	0.68	2.18
Tryptophan (g)	0.15	0.48
Tyrosine (g)	0.58	1.89
Valine (g)	0.73	2.36

Conclusion

Considering the several disadvantages of dairy butter with respect to health, which is reported to increase bad cholesterol food industry, is shifting towards alternative sources like plant-based butter also referred to as vegan butter? Plant-based butter often contains additional ingredients, such as salt, emulsifiers, colourings, and natural or artificial flavours, to more closely resemble the taste and texture of real butter. Additionally, bee pollen has gained a lot more prominence due to its certain nutritional qualities and the way that it appeals to consumers, the way they had when they consumed pollen and pollen products. Manufacturers who can address the certain challenges and shortcomings the pollen analog industry is facing over the years can commercialize the development of bee pollen butter and eventually make these products a worthy competitor and alternative to normal butter and other plant-based butter products**.**

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