



FOOD TECHNOLOGY MAGAZINE | ARTICLE

Hemp, Health, CBD, and Complexity

NUTRACEUTICALS



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Hemp seeds are recognized as a nutritious ingredient thanks to their fatty acid profile and digestible protein content. © KarpenkovDenis/iStock/Getty Images Plus

Last year, I attended NoCo Hemp Expo for the first time in my 20-plus years writing for the food industry. The Expo was an eye-opening, educational experience, which revealed that despite regulatory uncertainties, the hemp industry as a whole is an intriguing, growing market. According to the February 2019 edition of *Hemp Business Journal*, “Hemp product sales are projected to double and become a \$1.8 billion category by 2022.”

For the food industry, hemp stands to be a novel nutritional ingredient. High in protein, fiber, and fatty acids, and containing all nine essential amino acids required by humans (Leonard 2020), hemp’s nutritional profile in combination with it being considered a sustainable crop makes it an appealing ingredient. The 2018 Farm Bill removed cannabis and cannabis derivatives that are very low in THC ($\leq 0.3\%$ delta-9 tetrahydrocannabinol on a dry-weight basis) from the definition of marijuana in the Controlled Substances Act, opening the door for innovation. Because of the variety of nutritional components of hemp, various forms are found in foods and beverages.

Hemp Seeds

“Hemp seeds are a nutritional powerhouse. Unique to hemp seeds is the fatty acid profile combined with high quality, digestible protein,” says Ben Raymond, director of research and development, Victory Hemp Foods. “Hemp hearts (soft inner part of hemp seed) are a fantastic source of vegan omega-3 fatty acids in the form of alpha-linolenic acid (ALA). While many traditional seeds used for oil contain a significant amount of ALA, they usually have a ratio of omega-6 to omega-3 fatty acids that is less than optimal for human nutrition. “Hemp seeds and oils are approximately three parts omega-6 to one part omega-3, an optimal ratio for the nutritional health in humans,” he explains. Raymond also notes that hemp seeds contain about 35% protein, comprised mainly of edestin and albumin.



Urban Pie offers four pizza varieties in its new artisan crust line made with hemp seeds: Chicken Pesto, 6-Cheese, Spinach and Roasted Mushrooms, and Pepperoni and Chicken Sausage. Photo courtesy of Palermo Villa

Hemp seed is the latest addition to Palermo Villa's newest line of frozen pizzas. "It's hard to ignore the buzz (no pun intended) around hemp and CBD [cannabidiol]. We closely watch emerging trends and are always looking for ways to incorporate them into our pizza innovation," says Nick Fallucca, chief innovation officer, Palermo Villa. The company recently added a new line of hemp pizzas to its *Urban Pie* line of frozen pizzas. Hulled hemp seeds are baked into the crust, providing fatty acids such as omega-3 and omega-6 and a good source of plant-based protein.

"Hemp seeds allowed us to enter that market in a noncontroversial way because the hemp seed doesn't contain any THC. It also made a lot of sense as we found that consumers are continually looking for functional benefits in convenience foods," explains Fallucca. "When we tested new concepts with consumers, hemp rose to the top. Hemp seeds contain omega-3 and omega-6 essential fatty acids, are a good source of plant-based protein, and are often consumed to

reduce inflammation. We put those benefits into pizza, which is the ultimate convenience food when you're looking for a fast and easy meal to feed yourself or a group of people.”

Hempè (The Hemp Food Company) is a new plant-based hemp food made with cultured hemp hearts, chia seeds, and chickpeas. It is cultured like tempeh, and consumers can pan fry or sauté it to create their own hemp-based entrées or sides.

Hemp Oil

The fatty acid profile is one of the reasons that hemp is nutritionally appealing. In a comprehensive review, Leonard et al. (2020) said that approximately 30%–35% of hemp seed is comprised of oil, about 90% of which is unsaturated fatty acids. Hempseed oil is dominated by essential fatty acids, linoleic acid, ALA, and oleic acid.



Hemp extract is sought after to potentially benefit areas like mood and stress. Photo courtesy of Evo Hemp

Hemp extract can be found in Evo Hemp's line of hemp-infused herbal teas. The company, along with beverage maker Mood33, announced the line in December 2019. The teas are infused with Evo Hemp's organic, U.S.-grown hemp extract, and made with premium botanicals and real fruit juices. Each bottle of *Mood33* hemp-infused herbal tea contains 33 mg of full-spectrum hemp to support the body's endocannabinoid system.

Earlier this year, Victory Hemp Foods entered into a strategic partnership with Applied Food Sciences, which will elevate sales and marketing for their food and beverage ingredients, including their two proprietary ingredients, *V-70 Hemp Heart Protein* and *V-ONE Hemp Heart Oil*. "*V-ONE Hemp Heart Oil* is a minimally processed oil. The product retains the same omega-6–omega-3 ratio found in hemp seeds, as well as micronutrients like vitamin E and oil-soluble bioactives like beta-sitosterol," says Brian Zapp, creative director, Applied Food Sciences. "*V-ONE* can be a wonderful complementary ingredient when formulated in salad dressings, spreads, and dips. It is best suited to lower-temperature cooking due to the

delicate nature and large content of omega-3 fatty acids.”

In May, AIDP announced that it will be distributing Verdant Oasis European Hemp products. Using proprietary CO₂ extraction and refining technology, *VERDANT OASIS Panoramic Entourage Oil* captures the complete essence of hemp’s actives and is available in powder, water-soluble oil, and oil for dietary supplements and beverage and food applications.

Hemp Protein

The amino acid profile of hemp protein is characterized by very high levels of arginine and glutamic acid, with a moderate quantity of sulfur-containing amino acids (Leonard et al. 2020). Studies indicate that hemp protein may potentially benefit cardiovascular health and inflammation. In a study with hypertensive rats, Girgih et al. (2014) suggested that hemp seed meal protein hydrolysate with strong hypotensive effects could be used as a therapeutic agent for both the prevention and treatment of hypertension in spontaneously hypertensive rats. Rodriguez-Martin et al. (2020) showed that hemp protein products decreased the proinflammatory mediators and

increased anti-inflammatory mediators in lipopolysaccharide-activated primary human monocytes.

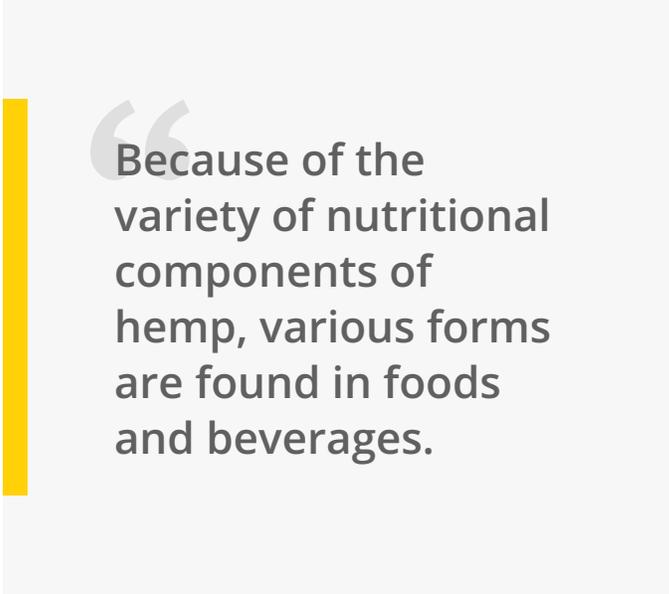
“Plant-based protein continues to be one of the fastest-growing ingredients among global food and beverage launches,” says Zapp. “Food and beverage launches tracked with selected dietary claims had ‘plant-based’ products growing at 64% over the previous year and ‘high in protein’ claims at 22% over the previous year” (Innova Market Insights 2019).

“Plant proteins are an attractive alternative as they tend to meet the requirements of popular diets such as vegan, paleo, and keto,” Zapp continues. *V-70 Hemp Heart Protein* (Victory Hemp Foods) has a smooth texture, complementary nutritional value, and bland color and flavor. “At 70% protein, only 28.6 g of *V-70* per serving yields 20 g protein per serving in the finished product, making it easy to hit protein targets for nutritional labels,” says Zapp.

Cannabidiol (CBD)

“According to Nielsen, the hemp-derived CBD market is booming, and is expected to reach \$2.3 billion this year and climb to \$6 billion by 2025,” observes Collette Kakuk, vice

president of global marketing, HempRise, a subsidiary of Layn Natural Ingredients. “Potential users want convenient delivery forms they are familiar with, and food and beverages rank highest. According to a survey from High Yield Insights, 57% of consumers want to get CBD in baked goods, 45% want it in chocolate, 30% want it in beverages, and 29% want it in snack foods, while 42% want capsules and 37% want gummies (High Yield Insights 2019). What we’re seeing is that as consumers are demanding more convenient consumption formats, there is a convergence of food looking more like supplements and supplements more like food.”



“Because of the variety of nutritional components of hemp, various forms are found in foods and beverages.”

At present, regulations surrounding cannabidiol (CBD) are not as clear.

Currently, CBD cannot be marketed as a dietary supplement, and foods to which CBD has been added cannot be introduced into interstate commerce, given the Food, Drug, and Cosmetic Act. The U.S. Food and Drug Administration (FDA) has issued warning letters to several companies for illegally selling products containing CBD in ways that violate the Act, including marketing CBD products to treat diseases. The FDA is continuing to explore potential pathways for various types of CBD products to be lawfully marketed.

“Even as the regulatory landscape remains uncertain regarding the immediate future of CBD in food and beverage products, we anticipate continued strong growth for CBD. As the FDA continues its work on cannabinoid regulation, CBD usage continues to rise. As consumer demand continues to skyrocket, we anticipate guidance and frameworks to be issued from the FDA that will allow the use of CBD in food and beverage,” observes Kakuk.

Users turn to CBD to help support issues like anxiety, stress, sleep, and inflammation. Kakuk says that according to *Consumer Reports*, 32% of millennials and 12% of baby boomers in the United States use CBD for

anxiety. A study published in *Neuropsychopharmacology* showed promising results for the use of CBD and other cannabinoids for easing anxiety (Bergamaschi et al. 2011). More recently, Martins de Faria et al. (2020) showed that acute CBD administration at a dose of 300 mg helped decrease anxiety in patients with Parkinson's disease.

HempRise offers everything from single ingredients to powerful functional solutions including other botanicals customized to specific applications in beauty, personal care, supplements, food, beverages, pets, and more. "CBD was initially the most readily available cannabinoid, and now as more data unlock the power of the endocannabinoid system, we are discovering increased opportunities from minor cannabinoids such as CBG, CBC, CBN, CBGa, as well as a series of terpenes, all of which are found in hemp extracts," says Kakuk. "By not excluding the minor cannabinoids vs. using a single isolate, like CBD, the complete properties of hemp extract provide an entourage synergy (benefit of ingesting multiple cannabis plant components together compared with ingesting one component at a time). It's something we at HempRise are focusing on with

clinical studies and support we provide to customers.” HempRise currently offers products such as *HempClean* (Full Spectrum with <0.2% THC) and *Hemp Broad* (Broad Spectrum – nondetectable/0% THC).

Kakuk cautions that there is a known lack of consistency in CBD ingredients and finished products. “Due to the popularity of CBD, many inexperienced players are getting into the supply game. Without proper industry expertise, many products have CBD levels that do not match what is on the label, and there are discrepancies between the claimed and true content of CBD.” Because the CBD market is in its early stages, concerns in the food industry revolve around science, safety, testing, and quality. In addition to questionable CBD levels, other concerns include lack of appropriate processing controls and practices, unproven health claims, and the potential presence of unsafe levels of contaminants (e.g., pesticides, heavy metals, and THC) in CBD products. Testing, transparency, credibility, reliability and product consistency between production lots, depth of experience, cGMP, sustainability initiatives, formulation expertise, knowledge of regulatory environment, vertical supply chain

integration, and ingredient forms are just some of the checklist items Kakuk recommends considering in evaluating CBD suppliers.

Next month's Nutraceuticals section will address immunity-enhancing ingredients.

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