Innovation in Western Canadian Functional Food Ingredients

Canada’s functional food ingredients industry is well established with innovative, entrepreneurial companies in all provinces. The current sector has developed many technologies and most are protected in some manner (e.g., through trademarks, intellectual property, licensing, proprietary property, etc.). Many companies have been spawned in Canadian public laboratories and supported at the various stages of product research, development, and commercialization by a number of public funding pools.

There are several interesting ingredients available from Canadian companies for food manufacturers in the breads, bakery, and cereals sector. This article focuses upon ingredient innovation from traditional and specialty crops of significance to western Canadian agriculture.

Novel Fiber Ingredients

A fairly common route to the discovery of new ingredients in Canada is through partnerships with universities that subsequently lead to the spin-off of a new enterprise. Such was the case with Viscofiber, produced by Cevena Bioproducts Inc. of Edmonton, Alberta. The ingredient consists of a high viscosity β-glucan with the original molecular structure of the natural β-glucan relatively intact. Viscofiber is up to 20 times more viscous than the competing products. The technology originated from proprietary science conducted at the University of Alberta.

Viscofiber products are oat- and barley-based concentrates with up to 60% β-glucan and are appropriate for use in opaque liquids, semi-solid and solid foods and beverages, functional foods, dietary supplements, and cosmetics. Cevena’s products hold Generally Regarded as Safe (GRAS) status as food ingredients, an important criterion for many Canadian companies attempting to market novel ingredients into the United States.

Emerald Seed Products Ltd. of Avonlea, Saskatchewan, specializes in fenugreek products for food applications. Fenugreek is a leguminous plant, which the company grows and processes in western Canada. It is used as a spice in the Middle East and India. In Middle Eastern and Ayurvedic medicines, fenugreek is used to treat diabetes. Canafen Gum provides a minimum of 75% soluble fiber in the form of galactomannan and is suited to emulsification and thickening applications to provide viscosity, stability, and texture. With a minimum of 90% fiber content, FenFiber is a unique ingredient targeting glycemic index and body weight management. Fenugreek Phyto Extract offers a concentrated source of phytoneutrals with a minimum 10% oleoresin.

Functional Ingredients from Peas

Pulse fibers and flours, especially those derived from peas, provide interesting ingredients for their functionality in food products, including baked goods, snacks, health drinks, and prepared meats as well as for their health benefits. Best Cooking Pulses, Inc. located in Portage La Prairie, Manitoba, supplies novel pea fibers and pea bran meal, pulse flours, and custom grinds. All pulse fiber and flour is gluten, lactose, and cholesterol free.

In 2005, Parrish & Heimbecker Limited partnered with Asia Specialty Ingredients Inc. to form a new company, Nutri-Pea Limited, also based in Portage la Prairie. Nutri-Pea specializes in the wet milling and separation of yellow Canadian peas into pea protein isolates, native and modified pea starches, functional and dietary fibers, and a number of specialized blends. Their pea fiber boasts a total dietary fiber level of more than 90% and is neutral in flavor, color, and texture, with a unique combination of soluble and insoluble fiber, native starch, and protein that provides water (or fat) binding and offers an excellent fat replacer.

Hemp—Canada’s New Entry into Functional Foods

Industrial hemp and marijuana are both classified as Cannabis sativa, a species with hundreds of different varieties, which is a member of the mulberry family. Industrial hemp is bred to maximize fiber, seed and/or oil, while marijuana varieties seek to maximize THC (delta-9-tetrahydrocannabinol, the primary psychoactive ingredient). Industrial hemp has a THC content of between 0.0% and 1%. Marijuana has a THC content of 3% to 20%.

In Canada and the European Union, only varieties containing less than 0.3% THC in their flower portions are permitted as commercial crops. In 2004, a favorable court decision in the United States ended a 2-year legal struggle to approve hemp as a food ingredient and provided a huge boost for Canada. The United States prohibits commercial cultivation of industrial hemp but allows the import of seeds, oil, flour, and other by-products to be manufactured into ready-to-eat foods in the United States. Before the seed is used as a food ingredient, the hull is usually removed, effectively removing all but the most microscopic amounts of THC. The shelled hempseeds used in food each typically contain less than 3 parts-per million (ppm) of THC.

According to research from AC Nielsen, hemp is one of the key “good for you” food industry categories that is witnessing consistent year-over-year sales gains. Data from SPINs indicates that sales of hemp foods have grown more than 50% in each of the past two years.
Hempseeds have a nutty flavor similar to pine nuts. With about 25% protein, whole hemp seed is second only to soybean in terms of protein content, which is found mostly as edestin, a highly digestible storage protein. Hempseed protein contains all nine essential amino acids in a favorable ratio for health. Hemp oil is unique due to the presence of gamma linolenic acid (2–5%), the omega-3 fatty acid, alpha linolenic acid (ALA) (15–25%), and stearidonic acid (C18:4 omega-3 at 3%).

The plant’s shelled seed, or nut, can be added to baked goods and nutritional supplements and bars, sprinkled onto other foods such as salads and yogurt, or eaten alone as a snack. The seed can also be milled into flour, which can be used for baked goods, and pressed to make oil, which can be used in salad dressings, dips, spreads, and sauces.

Organic Hemp Protein Powder with fiber is being offered by Winnipeg-based Manitoba Harvest, which has also recently introduced hemp milk in various flavors into the North American market. The company offers hemp seed nut butter, hemp seed nuts, and oil. Hemp Oil Canada Inc. in Ste. Agathe, Manitoba, manufacturers similar hulled hemp seed ingredients. The company provides custom processing including hemp seed oil crushing, hulling (shelling), toasting, roasting, cracking, or sterilizing.

Flax Ingredients in Bakery Applications

Whole and milled flax are of increasing interest to the food industry and are added to numerous products, including rolls, bagels, multigrain breads, muffins, cereals, pasta, energy bars, and dry mixes for pancakes, muffins, and waffles. ALA and the lignans in flax remain stable under common baking temperatures of 350ºF (178ºC). In baking, milled flax can be substituted for the fat used in recipes at a ratio of 3:1. Milled flax also can replace some of the flour in baked goods, levels of which are determined by the desired textural characteristics of the finished product.

Mintel’s Global New Products Database reports that in 2005, 72 new products were launched in the United States that listed flax or flaxseed as an ingredient. In the first 11 months of 2006, there were 75 new products launched. This research reveals that omega-3 products including flax have one of the highest growth potentials of all functional food ingredients.

Pizzeys Milling, based in Angusville, Manitoba, holds several patents for ensuring high stability milled flaxseed products. Through the MeadowPure process of separating immature and damaged flax seeds, the company guarantees the stability of its flaxseed products for upwards of two years. Various levels of incorporation of MeadowPure flax will allow a product to carry a “rich, high or excellent” source of ALA omega-3 in accordance with FDA nutrient content labeling guidelines.

Pizzeys’ SelectGrad “Ultra-Fine”-milled flaxseed can be incorporated directly into nutritional powders, high-protein and muscle-bulking powders, and energy products. For high microbiological purity, the company recommends the use of its pasteurized BevGrad whole-milled flaxseed. For nutritional products that target the women’s and mature-consumer market, NutriGrad flaxseed lignan/fiber complex offers 55% dietary fiber, 6% lignans, and an exceptionally high level of antioxidant activity.

Saskatoon, Saskatchewan-based Bioriginal Food and Science Corp. is marketing three unique powdered flax meal products. Due to processing technology, these are higher in ALA and lignans, as well as soluble and insoluble fibers, in comparison to regular milled flax. They are also rich in calcium and a good source of protein.

Bakomega is a stabilized flax flour with 6–10% oil content, thus providing higher levels of the ALA than defatted flax “meal” products. Its advantages include a claimed 2-year shelf life, increased functionality (it functions like flour), and improved sensory properties. Fibromega is designed to increase fiber and ALA with typical nutritional profiles of 42.6% fiber (60% soluble and 40% insoluble) and 5.5% ALA. The product is also gluten and allergen free. Clinically, Fibromega has been shown to reduce constipation and to have a positive effect on satiety that may lead to weight loss. The third product, ProBioFlax, combines the synergistic benefits of organic flaxseed concentrate with scientifically proven probiotic strains.

New Ingredients Reaching the Market

InfraReady Products Limited, Saskatoon, has developed Anthograin bran, an ingredient prepared from purple-pigmented cereal grain in which whole wheat kernels are treated with infrared technology and debranned to produce uniformly sized particles. Anthograin bran contributes functional characteristics to foods including a desirable chocolate-like color. Anthograin bran has very high levels of total anthocyanins and phenolic compounds that are responsible for its purple color and high antioxidant activity. In fact, the antioxidant activity is similar to blueberries as measured by the Oxygen Radical Absorbance Capacity (ORAC).

New ingredients are being developed that offer the nutritional benefits of the whole flaxseed plus eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) from fish oils. Pizzeys’ Milling, Manitoba, has developed a novel flaxseed–fish oil blended ingredient. MeadowPure Omega 3 Ultra is a granulated, free-flowing powder of milled flax in combination with either 2.2% or 8% fish oil. The omega-3 fatty acids in both flax and fish oil impart a variety of health benefits. Antioxidants within the flax provide an increase in the stability and shelf-life of the long chain polyunsaturated fatty acids (PUFAs) present in the fish oil as the oils are naturally encapsulated in the milled flaxseed. MeadowPure Omega 3 Ultra is shelf stable, has no taste or smell, and is easily incorporated into dry formulations.

MeadowPure Omega 3 Ultra is the subject of a recent patent application that encompasses stabilized fatty acid compositions combined with specially selected and milled flaxseed. The innovation is based in part on a previous patent by the company that describes the very active and stable antioxidant system present in flaxseed.

The western Canadian functional food ingredient sector has garnered a great deal of attention and enthusiasm on the part of local and federal governments, the agri-food sector, and health care and research communities for its potential to provide diversification and market growth for western Canadian agriculture. It is anticipated that this innovative and rapidly growing industry will continue to flourish with the new and increasingly significant role that agriculture is playing as a “solution provider to health” in Canada and beyond.

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