

Nutrition & Sensory Profile

Background

Canaryseed has been recently approved for human consumption in both Canada and the United States. It is a true cereal grain containing bran, germ and starchy endosperm and is a member of the same family as wheat, oats, barley, and rye. It is gluten-free, high in protein, high in fat, and a rich source of folate, phosphorous, magnesium, and manganese, compared to other cereal grains.

Canaryseed has a history which began in the Mediterranean area in the mid-1500's. Glabrous (hairless) canaryseed was developed in Canada via plant breeding techniques and is more suitable as a food crop. Canaryseed, with the hull removed, was approved for human food consumption in both Canada and the United States in late 2015. For approval purposes, it was compared to cereal grains including oats, wheat, barley, and rye. The current varieties of canaryseed have a brown seed coat. A yellow seed coat variety, which is likely more suitable as a food ingredient, will be available for commercial planting in 2018.

Macronutrient Composition

Canaryseed is a good source of protein, unsaturated fatty acids, and fibre. Dehulled canaryseed or groats contain an average of 21% protein, 6.5% fat, 60% starch, and 6.5% total dietary fibre (Table 1).

Protein (21%)

The high protein value makes canaryseed unique amongst other common cereal grains and pseudocereals (non-grasses that are used like cereal grain such as quinoa, buckwheat, and amaranth). Compared to other cereals, the proteins in canaryseed have higher contents of the essential amino acids tryptophan, phenylalanine, isoleucine, and leucine. As is common with other cereals, it is deficient in lysine and threonine.



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Fat (6.5%)

Canaryseed has a higher oil content than wheat, barley, and many pseudocereals. The predominant fatty acids in canaryseed are palmitic - a saturated fatty acid (15%), oleic - a monounsaturated fatty acid (30%), and linoleic - a polyunsaturated omega-6 fatty acid (55%). In addition, canaryseed contains about 2% omega-3 fatty acids.

Starch (60%) and Fibre (6.5%)

The starch level of canaryseed is similar to other grains and pseudocereals. The majority of the fibre in canaryseed is insoluble; however, compared to other grains, it is low in fibre with levels more similar to buckwheat.

Table 1. Macronutrient composition of cereals and pseudocereals

		Protein (%)	Fat (%)	Starch (%)	Total Dietary Fibre (%)
Cereals	Canaryseed	21	6.5	60	6.5
	Wheat	8-16	2.3	59	11-17
	Oats	13-22	3-11	60	10-23
	Barley	12	2.1	58	15-23
Pseudocereals	Amaranth	16.5	5.7	61	15
	Buckwheat	12.5	2.1	54	7
	Quinoa	14.5	5.2	64	13

Micronutrient Composition

Many of the vitamins and minerals in canaryseed are higher than that of wheat, oats, and barley and compare more similarly to amaranth (Table 2). Specifically, canaryseed is a rich source of phosphorous, magnesium, and manganese relative to wheat, oats, and barley. Folate levels in canaryseed are higher than wheat, barely and oats and similar to values reported for amaranth and quinoa. As a gluten-free flour, it provides more iron than quinoa or buckwheat and more zinc than any other pseudocereal.



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Table 2. Micronutrient composition of cereals and pseudocereals (mg/100g)

		Folate	Phosphorous	Magnesium	Manganese	Iron	Zinc
Cereals	Canaryseed	0.12	660	213	6.4	6.9	3.9
	Wheat	0.09	410	180	5.5	6	4.4
	Oats	0.07	340	140	5	7	3.9
	Barley	0.03	470	140	1.8	6	4.0
Pseudocereals	Amaranth	0.73	537	279	9.6	7.6	1.6
	Buckwheat	0.02	347	203	1.6	4.7	1.0
	Quinoa	0.13	383	207	1.9	4.5	1.8

The phytochemicals tocopherols (forms of Vitamin E) in canaryseed are comparable to oats at 2.8 mg/100g. Canaryseed contains about 0.47mg/g of plant sterols with β -sitosterol being the primary sterol comprising about 43% of the total sterols. The major carotenoids in canaryseed are β -carotene, lutein and zeaxanthin. The high level of β -carotene (5700 μ g/kg) distinguishes it from other crops.

Gluten-Free and Wheat Allergen Statement

Canaryseed has been tested and proven to be gluten-free (contains no gluten protein) and is therefore safe for individuals with celiac disease. However, during the safety studies on the grain, it was observed that it may contain a protein similar to a wheat allergen protein.

To inform wheat allergic consumers, the statement “*may not be suitable for consumers with a wheat allergy*” must appear on labels of pre-packaged canaryseed and pre-packaged foods using canaryseed as an ingredient and not containing wheat. Research is continuing to determine if canaryseed would elicit an allergic reaction in wheat allergic individuals.



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Sensory Profile

Canaryseed has a natural nutty flavour that is enhanced with roasting and other processing techniques. It adds a light, crunchy texture to the food product. It scored high for appearance, texture, taste, and acceptability in preliminary sensory panels. It is available in both brown and yellow grains.

Dehulled (Groats)

Unroasted or roasted groats can be used on its own similar to quinoa, to top baked goods or incorporated into snacks such as snaps and energy bars.

Flours

Heat-treated, whole grain flours of different textures can be made into a range of products including breads, tortillas, crackers, pasta, and muffins. It cannot completely replace gluten containing flours in most current recipes, but preliminary tests demonstrate it works well in flour blends.

Other Uses

The dehulled grains and flours can be further processed into flakes, or extruded to make crisps or puffs.

Opportunities

- Canaryseed has shown potential in the baking industry, including the snack bar market.
- There is a need for a gluten-free grain that is high in protein, contains a mixture of healthy fats and antioxidants, such as carotenoids, and can be used in tasty and nutritious gluten-free products.
 - 20% canaryseed flour = “source of iron” claim on product and increase 1g protein
- Finally, there is opportunity for canaryseed to be consumed as a whole grain in the diet and to complement other plant-based foods and ingredients.

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