

Black Rice: A Nutrient-Packed Superfood

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In Manipur, black rice (*Oriza Sativa* L. Indica), also known as chak-hao, is highly valued for its eye-catching colour and mouthwatering aroma. Of all the nutritional grain products, it is thought to provide the highest concentrations of vitamins, minerals, fibre, proteins, and many other nutrients. It is also one of the richest sources of anthocyanin. The delightful aroma and stickiness of Manipur's black aromatic rice set it apart from other varieties farmed across the world. It is not entirely clear how chak-hao can be used in processed food items. Its distinctiveness, abundance, and health benefits make Chak-hao a promising ingredient for a wide range of processed food products. Since it contains more vitamins and minerals than both brown and white rice, purple or black rice is regarded as the healthiest type of rice. Anthocyanins are potent naturally occurring black colouring pigments that give black rice its colour and contribute to its health benefits. Black rice has been demonstrated to lower inflammatory levels in the body in addition to being a powerful source of protein, fibre, and vitamin E (Nitin and Roshini 2020). The results of the study suggest that eating black rice may aid in the treatment and prevention of major illnesses such as allergies, high blood pressure, cancer, atherosclerosis, and arthritis. Black rice is the greatest type of rice since it contains more amylopectin and less amylase than brown or regular white rice. Two substances make up starch: amylopectin and amylose. Therefore, stickier black rice is sticky; in spite of its name, it is gluten-free. Second, rice's high anthocyanin content imparts a black pigment that gives it a dark colour when it's fresh. As a matter of fact, black rice tastes slightly nutty. It pairs nicely with sticky textures, so it's a great choice for desserts like rice pudding, Kheer, rice bread, noodles, and other pasta dishes. Black rice is generally thought to be healthier than brown rice, and frequent consumption is thought to improve general health.

nutritional profile of black rice

It's claimed that black rice has the highest nutritional content of any variety. Additionally, the nutritional content of brown rice is comparable to that

of black rice. Most people like and eat white rice because it tastes nice, is easily accessible, and is reasonably priced. Due to black rice's increased nutritional content and health advantages over white rice, more people are incorporating it into their diets (Priya et al., 2019). Lipids, protein, iron, tocopherols, zinc, and vitamin B (riboflavin and thiamin) are found in the highest concentrations in black rice (Table 1). Therefore, in a number of foods processing companies, adding black rice to typical food items can improve their overall nutritional profiles.

Purpose of including Black rice in our daily menu

Any method of incorporating black rice into our regular diets can enhance our bodies' health and medical conditions. It is thought to be among the meals with the greatest nutrients. A few of the health and medicinal benefits of black rice are discussed here.

Low Glycaemic Index

A food's Glycaemic Index (GI), a numerical measurement, indicates how much it can raise blood sugar levels in the body. Meals are scored on a range of 1 to 100 and classified as low, medium, or high glycaemic meals. Blood sugar levels are affected as GI increases. When sticking to a low-glycaemic diet, high-GI foods should be replaced by low-GI ones. According to Christine et al. (2017), a low-glycaemic diet can help control blood sugar, lower cholesterol, and facilitate short-term weight loss. Therefore, black rice, which is popular in northeast India, might be used in place of a number of cereals, including those made from brown and white rice, due to its low glycaemic index of 42.

Powerhouse of antioxidant

Black rice's intense colour is a sign that it contains potent antioxidants known as anthocyanins. The rich purple and black colour of black rice is attributed to anthocyanins, which are also responsible for the colour of blueberries and blackberries. Dark-coloured fruits, including blueberries and blackberries, are well known for having great antioxidant qualities. Black rice works in a similar way. Antioxidants prevent diabetes, heart disease,

cancer risks, and illnesses that may lead to cancer by reducing the harm that free radicals cause to cells. (Roshini and Nitin, 2020)

Aids in diabetes prevention or management

Research shows that whole grains are far more advantageous and preventive than processed carbohydrates when it comes to the risk of acquiring diabetes and even obesity. Black rice is a lot better option than processed carbohydrates when it comes to slowing down the absorption of sugar in the circulation because it contains fibre, antioxidants, and other minerals (Nitin and Roshini, 2020). The body can benefit from the complete bran (where the fibre is stored) of black rice, which can help with the grain's longer-term absorption of glucose (sugar). Black rice also helps reduce blood sugar levels and diabetes due of its low glycaemic index.

Free of gluten

People with wheat allergies, gluten intolerance, or celiac disease can safely eat black rice because it doesn't contain gluten. All of the gluten-free grains—brown rice, black or purple rice, buckwheat, quinoa, amaranth, and white rice—are gentle on the small intestine and promote healthy digestion. When everything is considered, black rice is by far the healthiest type. It slows down aging, enhances cardiovascular health, and helps avoid various diseases like diabetes and Alzheimer's. Nitin and Roshini (2020) claim that ingestion appears to lower inflammation and maintain blood cholesterol levels. Black rice is a very beneficial food choice because it is high in fibre, low in sugar, and contains a moderate quantity of vitamin E.

Minimizes allergies and avoids constipation

Black rice has twice as much fibre than brown rice, which helps to ease constipation and promote smoother bowel movements. Thanuja B and Parimalavalli (2018) claim that after binding with harmful substances, the fibres likewise quickly wash out of the colon with the stool. The release of histamine, an amino acid that aggravates allergy symptoms, is inhibited by black rice. When black rice is eaten, the skin gets less inflamed and red (Nitin and Roshini, 2020).

Regulates Obesity

Black rice bran's high fibre content helps with weight loss and weight management. Eating black rice not only prevents hunger and increases feelings of fullness, but it also reduces the synthesis of fatty acids, which leads to an accumulation of intercellular lipids between tissues (Nitin and Roshini, 2020). Black rice also has detoxifying properties.

Keeps heart conditions at bay

Black rice is a fantastic diet since it contains the black pigment known as "anthocyanin" and has many other health advantages. According to Nitin and Roshini (2020), utilizing black rice in food processing can enhance the nutritional value of the goods made with it. It can also be used to create functional foods for certain groups of people, like those who have diabetes, obesity, high blood pressure, or heart problems. Making food out of black rice, which is not a food that is often consumed, will be a novel and beneficial approach to produce food for the coming generation of customers.

Use of black rice in processing and value addition

Because it includes the black pigment known as "anthocyanin" and has numerous other health benefits, black rice is an incredible diet. Nitin and Roshini (2020) assert that using black rice in food processing can improve the nutritional content of the products that are prepared with it. Additionally, it can be applied to the development of functional foods for certain populations, such as individuals with diabetes, obesity, high blood pressure, or cardiac issues. Since black rice is not a food that is commonly consumed, converting it into food will be a unique and healthful way to create food for the next generation of consumers.

Utilizing black rice in the contemporary food processing sector

People rarely have time to cook meals in today's fast-paced world, thus ready-to-eat (RTE) foods are growing more and more popular. It offers a useful way to eat whenever and wherever you like. It simultaneously fills the stomach and is easily eatable, lightweight, and portable. Ready to eat Cereals are produced using a variety of technological processes,

including heating, shaping, drying, sweetening, flavouring, and incorporating vitamins and minerals (Caldwell et al., 2016). Black rice pudding, Gulab jamun, noodles, and pastas; black rice mix cereals; black rice beer; black rice Nutri-bars; black rice cakes, muffins, and cookies; and black rice baby meals are just a few of the goods that are now made using black rice-fortified food processing technology.

Conclusion

Because black rice possesses latent potential that other varieties of rice do not, it is also referred to as the "magic cereal." The nutritional and therapeutic benefits that this specific rice can offer are really substantial. Black rice's strong antioxidant concentration places it in the superfood category, which is a nutritional bombshell. Due to black rice's high nutritional content, using it as a component would not only aid in creating a wide range of excellent food products but will also help to enhance nutrition, which is currently customers' top concern. The significant antioxidant activity, health benefits, and natural colouring properties of anthocyanin—particularly cyanidin-3-glucoside, the main pigment of black rice—are drawing increased attention from researchers. Because it contains a lot of tocopherols (vitamin E), iron, and antioxidants, black rice is a practical and inventive component in food processing. Its all-around nutritious makeup has also made it a viable addition and processing ingredient for meals. Due to its low glycaemic index, black rice has been shown to be beneficial for people who have allergic reactions to other cereal grains. It also reduces the risk

of developing diabetes, obesity, and cardiovascular diseases. Black rice has to be utilized as a special ingredient in food formulation, development, and value addition in order to fully realize its potential and validate its latent strength as a nutritional and therapeutic powerhouse. Furthermore, including black rice as an ingredient will increase the number of applications for it in the food processing industry and help increase knowledge, understanding, and technical expertise regarding the benefits of black rice's potential.

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Table 1: This table shows the nutritional profile of several rice cultivars per 100 g serving (Priya et.al., 2019)

Rice Cultivar	Carbohydrates (g)	Protein (g)	Fat (g)	Fiber (g)	Iron (mg)	Tocopherol (mg)	Thiamin (mg)	Riboflavin (mg)	Zinc (mg)
Black rice	34 ± 0.05	8.5± 0.5	2± 0.06	4.9± 0.3	3.5± 0.15	12.54±0.34	0.46± 0.032	0.403± 0.04	3.16± 0.05
Red rice	23 ± 0.04	7± 0.05	0.8± 0.01	2± 0.6	5.5± 0.14	10.77±0.24	0.33± 0.15	0.105± 0.03	1.91± 0.036
Brown rice	24 ± 0.07	7.9± 0.07	0.8± 0.02	1.8± 0.5	2.2± 0.07	2.2 ± 0.76	0.54± 0.07	0.1 ± 0.2	1.8± 0.05
White rice	28 ± 0.03	2.7± 0.04	0.3± 0.01	0.6± 0.1	1.2± 0.19	0.1 ± 0.14	0.7± 0.06	0.03± 0.33	1.4± 0.039
