



## **CELLULAR FRACTION-LINE <sup>CF</sup> ACTIVATED SPROUTED ORGANIC BLACK RICE**

**Cellular Fraction-Line <sup>CF</sup> activated Sprouted Black Rice Powder is a one-of-a-kind functional food with a broad spectrum of popularity and application that is unique to the market.**

Black Rice also referred to as Purple Rice and, in Thailand as “Mountain Rice” (*khao doi*), is a dry-land rice, rich in anthocyanin antioxidants, minerals, vitamins and amino acids. It is the most nutritious variety of rice with higher nutritional values than either white or brown rice. Black rice is a wholegrain which is gluten free, cholesterol free, low in fat, sugar and salt yet high in fiber, anthocyanin antioxidants, Vitamins B and E, niacin, thiamin, magnesium, iron, zinc and phosphorous.

### **The Ultimate Functional Food:**

The combination of attention to scientific detail with renewed reverence for correct cultural preparation has given life to the ultimate Functional Food. “Functional Food” is an industry category assigned to foods that deliver therapeutic levels of beneficial constituents in a convenient Whole Food form. Our product maintains consumer acceptance as a common food while providing extensive scientific research of its effective health values. Independent studies have shown positive results from Black rice in weight management, treating various forms of Inflammation, regulating blood, gut rehabilitation and even certain forms of cancer.

### **Category Management:**

The Natural food industry as well as mass market utilizes a system known as Category Management. Categories are created to designate shelf space for products that fit into specific dominant buying trends.

The hottest selling and most consistent categories each of which are applicable to our Cellular Fraction Line bioactive sprouted black rice powder are as follows:

1. Gluten Free
2. High Fiber
3. High ORAC (Antioxidant rich)
4. Low Glycemic
5. Weight Management
6. Vegetarian
7. Vegan

## Solubility

As a food ingredient sprouted black rice powder is highly soluble. Solubility ties into taste as well as ease to combine with other ingredients. Given a very low acid level, it mixes well with most ingredients. This high level of solubility is enhanced by Cellular Fraction- Line Technology (CF) which creates a porous, highly soluble particle structure. This porous particle structure combined with low acidity and a moderate metabolic rate makes our sprouted black rice powder an ingredient that mixes well into a wide range of formulations. Sprouted black rice has a pleasant taste, creating another positive factor supporting its use as catalyst ingredient in formulations.



Organically Certified Black Rice Fields



Inspection Prior to Harvest



Fully Mature Black Rice



Soft-Milled for Maximum Benefits

Thai Freeze Dry works with organically certified black rice co-ops, which are comprised of Hill Tribe farmers. An important part of our corporate culture is to support these farming communities in their attempts to obtain a sustainable income.

## Black Rice: the Emperor's Rice

In ancient China, Black Rice was set-aside exclusively for Royalty. It was thought that it would extend their lives. In light of recent scientific studies on the anti-aging effects of antioxidants it seems that this ancient knowledge was on the mark.

## Production of CFL Activated Sprouted Black Rice Powder



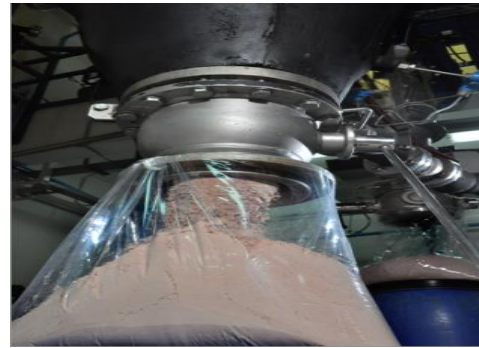
Black Rice Sprouts Equal To  
One Serving



Loading The Machine



Super-Freeze With Liquid CO<sub>2</sub>



Sprouted Black Rice Powder



Black Rice  
Powder



**Organically Grown:** Rice cultivation typically involves substantial use of chemicals. Wet-land rice, grown in the same rice paddies over many years, depletes the soil to the point that considerable use of chemicals is required. In contrast, all of our mountain grown, dry-land black rice is organically grown.

**F.D.A. Approved / G.M.P. Certified/ HALAL Approved:** Thai Freeze Dry's Factory is F.D.A. Approved, G.M.P. Certified and Halal Certified and is a food facility registered with the U.S.A. F.D.A. Our Sprouted Black Rice Powder product is approved by the Thai F.D.A. as well as Halal.

**Soft-Milled:** The normal milling of "cargo" rice (rice for export) requires that the rice germ and the vast majority of the kernel be removed. At the end of this milling process most of the benefits have been removed; the anthocyanin antioxidants in the kernel, the fiber and other beneficial ingredients are lost in the normal milling process. To make matters worse some countries require that the milled rice be steamed prior to shipment. The exposure to extreme heat denatures the enzymes and diminishes the value of thermo-sensitive vitamins that may have survived the milling process. This rice is essentially dead on arrival.

Thai Freeze Dry works closely with its rice co-ops to "soft-mill" our black rice to our specifications. The rice germ is entirely left intact and the kernel is included. The soft-milled black rice provides a dramatically higher quality product.

### **Sprouting:**

Our process respects traditional knowledge regarding the consumption of rice. By sprouting our black rice we create an easily digestible food in its culturally correct form. Several top selling books have been written on the "Paleolithic" theory explaining the benefits of eating sprouted foods. This theory has launched a popular long-lasting dietary trend around such products to the point of becoming a foundation for mainstream nutritionists.

Sprouts are one of nature's most complete and nutritionally beneficial foods. Rice is designed by nature to remain dormant until it is fully mature and the right growing conditions exist. This dormant stage is enforced by enzyme and nutrient inhibitors such as phytic acid. In the sprouting process these inhibitors are neutralized and the enzyme and nutrient profile improves dramatically. You get the power of sprouts in a stable form (dry powder).



Sprouting Machines



Black Rice Sprouts

Thai Freeze Dry has imported state-of-the-art commercial sprouting machinery. Computerized control boards allow us to adjust the speed and frequency of the rotation of the drums, adjust moisture levels and regulate airflow to achieve safe sprouts.

### **Nutritional data (per 100g) of TFD Sprouted Black Rice Powder:**

<b>Nutrient</b>	<b>Amount</b>
Alanine	0.437 g
Arginine	0.569 g
Ash	1.27 g
Aspartic acid	0.702 g
Calcium, Ca	33 mg
Carbohydrate, by difference	76.17 g
Copper, Cu	0.277 mg
Cystine	0.091 g
Energy	1515 kj
Energy	362 kcal
Fatty acids, total	0.971 g
Fatty acids, total polyunsaturated	0.959 g
Fatty acids, total saturated	0.536 g
Fiber, total dietary	3.4 g
Folate, DFE	20 mcg DFE
Folate, total	20 mcg
Glutamic acid	1.528 g
Glycine	0.369 g
Histidine	0.190 g
Iron, Fe	1.80 mg
Isoleucine	0.318 g
Leucine	0.620 g
Lysine	0.286 g

<b>Nutrient</b>	<b>Amount</b>
Magnesium, Mg	143 mg
Manganese, Mn	3.743 mg
Methionine	0.169 g
Niacin	4.308 mg
Pantothenic acid	1.493 mg
Phenylalanine	0.387 g
Phosphorus, P	264 mg
Potassium, K	268 mg
Proline	0.352 g
Protein	7.50 g
Riboflavin	0.043 mg
Serine	0.388 g
Sodium, Na	4 mg
Thiamin	0.413 mg
Threonine	0.275 g
Total lipid (fat)	2.68 g
Tryptophan	0.096 g
Tyrosine	0.281 g
Valine	0.440 g
Vitamin B-6	0.509 mg
Water	12.37 g
Zinc, Zn	2.02 mg
	0.281 g

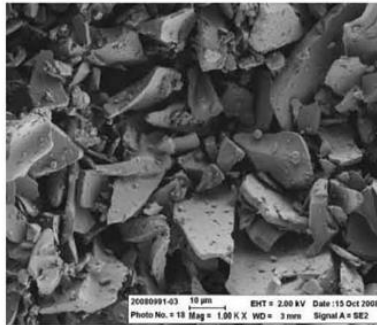
## Cellular Fraction-Line Technology <sup>ft</sup> (CFL) :

Cellular Fraction-Line Technology <sup>ft</sup> is a key element in the creation of our functional foods. It allows us to preserve a Whole Food in its fresh form, thus maintaining all of the medicinal activity of a live plant while providing the safety of a stable commodity.

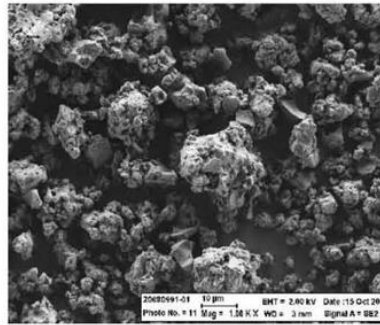
This proprietary and transitional preservation process gives Thai Freeze Dry the unique ability to provide superior product. The sprouted black rice is dried while it remains frozen in a vacuum. Rather than sitting motionless on trays, it is flying round (vigorously and continuously) in the product chamber. The deeply flash-frozen granules decrease in size due to sublimation of the connecting ice structure and break into increasingly smaller particles along natural cellular fracture lines.

This creates a smaller particle size and porous particle structure without the cellular hemorrhaging caused by mechanical grinding. These particles are much more easily absorbed and metabolized (more bio-available), and are more soluble for use as an ingredient in other formulations.

### 10 $\mu$ m scale



Tray Freeze Dried/Mechanically Ground



Cellular Fraction Line Technology (CFL)

The key to the efficacy of CFL activated sprouted black rice powder lies in the fact that CFL preserves the complex cellular and molecular structure of black rice as it grows in nature. The healing message is not carried in only one or a few isolated ingredients often used in our industry as markers to evaluate efficacy. In fact, these contents are most effective when the cellular and molecular structure of the plant is kept intact. This is where CFL surpasses all other technologies for preservation of herbs and botanicals and delivers the healing message formulated by nature.

Analysis of the individual components is not an incorrect analytical system but must exist together with and compliment the more holistic approach where we come to understand how the plant's activity moves through the body with higher levels of interaction and organization.

### **The perfect ingredient to add good health:**

Louisiana State University (Department of Food Sciences) researchers have suggested that food manufacturers can use black rice as a catalyst ingredient to boost the health value of cereals, beverages, shakes, smoothies, rice cakes, ice cream, gelato, yogurt, noodles, protein and meal replacement bars, snack foods, cookies and other baked goods and packaged foods.

The high level of solubility due to our small particle size and porous particle structure make it an exceptionally soluble ingredient. In addition to food products which include black rice, we provide black rice in pure powder form for our customers to utilize in their own formulations. This empowers customers to determine their own health destiny and make a sound investment in their most precious asset.

The quality and effectiveness of our CFL bioactivated sprouted black rice powder is the result of the remarkable protocols and processes we employ from the fields to the finished product:

- Organically grown black rice
- F.D.A. Approved / G.M.P. Certified
- Soft-Milled to preserve the kernel and rice germ
- Sprouted to neutralize enzyme and nutrient inhibitors, boost nutritional content and make it easier to digest
- CFL activated for best preservation and highest bio-availability/solubility

For details on our evolutionary and transitional Cellular Fraction- Line Technology brief please see <http://www.thaifreezedry.com>

## **HEALTH BENEFITS OF BLACK RICE**

### **Why should I eat black rice? What are its benefits?**

This may be best answered by referring to just a few among the huge number of scientific studies that focus on black rice and provide insight into why our black rice powder is one of nature's most well-balanced "super-foods" truly remarkable in its abilities.

#### **Antioxidants:**

The remarkable dietary balance of black rice makes it an antioxidant rich whole super food.

A distinguishing characteristic of Black Rice is the strong anthocyanin antioxidants contained in the deep-purple flavonoid pigments in its kernel. The strong antioxidant properties of Black Rice make it an effective anti-inflammatory food; which helps cut down on general infections and illnesses. Many health reports point out that anthocyanins protect against damaging free radicals that can give rise to a wide spectrum of serious health problems.

Dr. Zhimin Xu, associate professor at the Department of Food Sciences of Louisiana State University reports that "Just a spoonful of black rice bran ... contains more health promoting anthocyanin antioxidants than are found in a spoonful of blueberries, but with less sugar, and more fiber and vitamin E antioxidants."

- Findings announced at 240<sup>th</sup> National Meeting of the American Chemical Society (ACS) Boston, Mass.

Cornell University researchers found that antioxidant content was approximately six times higher in black rice than in common brown/white rice. The black rice bran had higher content of phenolics, flavonoids and anthocyanins.

- *Journal of Agricultural and Food Chemistry*, July 14, 2010; 58(13): 7580-7

## **Hypertension:**

In an article published in the “American Journal of Clinical Nutrition” investigating the consumption of major flavinoid groups (flavonoids, flavones, flavonones, flavan-3-ols, proanthocyanidins, and anthocyanins) determined that anthocyanins were the group most significantly associated with prevention of hypertension.

- Cassidy; Habitual intake of flavonoid subclasses and incident hypertension in adults; *American Journal of Clinical Nutrition* (2011) 93:338-347.

## **Satiation / Weight Management:**

Satiation is a complex neurobiological phenomenon mediated by hormones and enzymatic reactions that send signals to the brain associated with the recognition of the feeling of fullness (satiety). In general, when your food provides adequate nutrition, receptors in the brain say “enough.” Your body is getting what it needs and this subconscious neurobiological realization signals you to stop eating. An understanding of human appetite regulation needs to account for the ongoing and recurring drive to eat and the suppression of eating via satiety signaling.

In the case of black rice there is a super-satiation effect that can greatly assist all those for whom weight management is a concern. In the dark purple flavonoid pigments in rice husk (pericarp) there are seven distinct anthocyanin species many of which are localized. Due to different localization patterns these are not released and digested in the same place and at the same time in your digestive tract. The effects are felt over time. They are, in a sense “time released.” The recognition process and digestion of the multiple species of anthocyanins slows the pace at which food moves through the digestive tract. In addition, the anthocyanins carried in the fiber slows down the oxidation of the food causing it to move slower and take longer to be processed.

- *Different Localization Patterns of Anthocyanin Species in the Pericarp of Black Rice Revealed by Imaging Mass Spectrometry* Yukihiro Yoshimura, Nobuhiro Zaima, Tatsuya Moriyama and Yukio Kawamrya  
Published online 2012 February 17, doi: 10.1371/journal.pone.0031285

Black rice has antioxidants woven through a carrier that is nutritionally well balanced, high in fiber (soft milled) and very low in sugar. Other foods with high levels of antioxidants (blueberries for one example) may also be high in sugar. Sugar oxidizes quickly and may neutralize any satiation benefit.

## **Cyanidin-3-glucoside -- C3G:**

This is a rare antioxidant found in abundance in the dark flavinoid pigments of black rice that effects the gene expression of fat metabolism. It turns off the gene expression for fat storage and turns on the gene expression for fat metabolism. You burn fat instead of storing fat. This makes black rice an effective and safe vehicle for weight loss.



- “Microarray profiling of gene expression in human adipocytes in response to anthocyanins”\_Takanori Tsuda, Yuki Ueno, Toshikazu Yoshikawa, Hitoshi Kojo, Toshihiko Osawa Biochemical Pharmacology 71 (2006) 1184-1197

Scientific animal studies (with dosage adjusted to the human equivalency of 250 mg C3G) indicate that in thirty days, C3G reversed the weight gain of a high fat diet to the level of a normal diet. Weight gain was significantly lower in the high fat diet plus anthocyanins as compared to the high fat diet only.

- Kwon; Anti-Obesity and Hypolipidemic Effects of Black Soybean Anthocyanins; Journal of Medicinal Food (2007) 10:552-556.

C3G helps to override the body’s dysfunctional inflammatory nutrient uptake signals that cause fat cells to store high levels of glucose which results in out-of-control appetite and obesity. Decreased levels of leptin ((fat cell signaling protein secretions) and increased levels of AMPK (an enzyme that helps to regulate your weight) triggers the use of stored energy from fat. The metabolic pathway and biological mechanism is covered in detail on the brief on C3G available at [www.thaifreezedry.com](http://www.thaifreezedry.com)

The overall effect of C3G results in prevention of obesity from diet as well as changing fat to muscle.

Tests conducted by Chiang Mai University indicate that the protein-based C3G extract is digested before it reaches the lower intestinal tract. It is in the lower intestinal tract that our food is either stored or used (sent into the bloodstream). If we are to change the gene expression of fat metabolism from storage to usage the C3G must reach the lower digestive tract. The bran complete whole grain sprouted black rice powder achieves location-specific delivery due to the fiber and other constituents, but the extract never reaches the lower gut where this transformation takes place and is, therefore much less effective despite its high concentration of C3G.

### **Anti-inflammation:**

Researchers at Ajou University in Suwon, S. Korea tested brown rice and black rice for their effectiveness in protecting against skin inflammations and found that the black rice bran did suppress dermatitis, but the brown rice bran did not. This scientific study suggests that black rice may be a “useful therapeutic agent for the treatment and prevention of diseases associated with chronic inflammation.”

- *Journal of Agricultural and Food Chemistry*, Aug. 23, 2010: 58(13):7580-5

In a study published in the “American Chemical’s Journal of Agricultural and Food Chemistry,” researchers found that mice fed with a diet supplemented with ten percent black rice bran significantly reduced inflammation and also found that black rice bran inhibits the release of histamine, a chemical that triggers inflammation. Black rice consumption can alleviate allergic dermatitis symptoms such as swelling, and allergy and asthma sufferers may find relief by adding black rice to their diet.

- U.S. Dept. of Agriculture’s Western Regional Research Center in Albany, Ca. presented in the American Chemical Society’s podcast series: “Global Challenges/Chemistry Solutions.”

## Diabetes:

Harvard School of Public Health scientists estimated that replacing about two servings a week of white rice with the same amount of black rice would lower diabetes risk by 16%.

- *Archives of Internal Medicine*, June 14, 2010: 170 (11); 96-99

Insulin resistance has been strongly associated with nonalcoholic fatty liver disease. Numerous studies have suggested that natural anthocyanins are potent antioxidants associated with prevention of diabetes. “We hypothesize that black rice containing C3G may reduce the risk of hepatic fat accumulation and improve insulin resistance.”

- *Black rice (Oryza sativa L.) extract attenuates hepatic steatosis in C57BL/6J mice fed a high-fat diet via fatty acid oxidation* Hwan-Hee Jang, Mi-Young Park, et. al. “Nutrition & Metabolism” 2.89

Scientific studies using rats as subjects with dosage adjusted to human equivalency of 120mg C3G demonstrated that in eight weeks C3G inhibited lipid peroxidation (cell membrane damage leading to cell death) , improved activity of superoxide dismutase (antioxidant defense mechanism of the body) and demonstrated a hypoglycaemic effect (lowering of blood sugar levels).

- Nasri; Vascular mechanisms of cyanidin-3-glucoside response in streptozotocin-diabetic rats; *Pathophysiology* (2011) 18:273-278

A clinical evaluation published in “American Journal of Clinical Nutrition” investigating the effects of consumption of major flavonoid groups concluded that anthocyanins were the only group significantly associated with a lower risk of Type II Diabetes.

- Wedick; Dietary flavonoid intakes and risk of type 2 diabetes in US men and women; *American Journal of Clinical Nutrition* (2012) 95:925-933.
- 

C3G decreases blood sugar levels and is, therefore considered to exhibit strong anti diabetic effects (alleviation of diabetic progression) associated with metabolic syndrome (anti-oxidant and anti-inflammation). C3G anti diabetic activities include:

- Stimulation of insulin regulated transporter activity in fat cells.
- Reduction of retinol binding protein 4 expression which contributes to insulin resistance
- Tumor Necrosis Factor-alpha levels associated with Type 2-diabetes are lowered
- Inhibition of terminal kinase activations which contribute to inflammation
- Reduction of reactive oxygen species (ROS) produced inside fat cells that can result in oxidative stress
- Increased glucose uptake

## GABA:

The digestion of grain proteins results in many nutrients including  $\gamma$ -aminobutyric acid (GABA). GABA is a neurotransmitter in the brain and spinal chord and induces tranquilizing effects. It is used as a medication to increase blood flow to the brain, to inhibit cancer-cell proliferation and provide other beneficial health effects. A purple (black) rice variety exhibited the highest GABA content of all 21 rice varieties tested at

Chiang Mai University. This indicates the importance of Thai purple rice cultivars for adding nutritional value to functional food products.

- “*γ-Aminobutyric acid (GABA) content in different varieties of brown rice during germination*”  
D. Karladee , S. Suriyong Department of Plant Science and Natural Resources, Faculty of Agriculture, Chiang Mai University, Purple Rice Research Unit, Institute for Science and Technology, Chiang Mai University *ScienceAsia* 38 (2012):13-17

### **A STRANGE THING TO SAY:**

You can't experience the benefits of black rice by eating black rice. First it should be sprouted as discussed above. Rice for export (cargo rice) has the most beneficial ingredients milled away and, in some cases the rice must be steamed prior to export. These precautions are taken to prevent spoilage during shipment, but the result is like throwing out the baby with the bath water. The black rice is a shadow of itself before it gets on the boat. Then you must cook the black rice (much longer than white rice) which further exposes it to extreme heat. The benefits are substantially diminished. Thai Freeze Dry's Cellular Fraction-Line <sup>CF</sup> activated sprouted black rice powder, in contrast, sustains all the benefits of black rice.

For prices & availability please email : [info@thaimassage.com](mailto:info@thaimassage.com)

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