

Image 1: A sample of germ retaining rice

Germ retaining rice

Catering for the continually increasing demand for high quality in China

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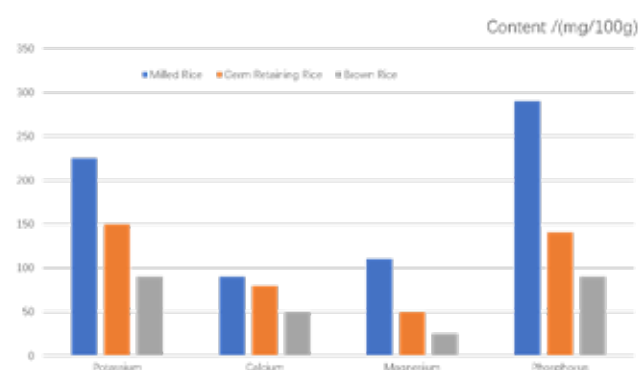
For close to a thousand years, rice has held a special place in the Chinese diet. Today, almost two-thirds of the entire population (1.4 billion) eat rice as their staple food. As the standard of living improves with social and economic development, consumer demands have shifted from an emphasis on quantity to one for taste and nutrition. Most of the nutrients in over-milled rice are lost. Compared with milled rice, brown rice tends to retain more nutritional value.

However, due to phytate, cellulose, and other substances contained in the bran layer, brown rice has a rough taste and is difficult to cook well. As a result, processing technologies which can maintain the germ while removing the bran are becoming more popular with rice millers.

These technologies allow millers to maintain the nutrition of brown rice while keeping the taste of milled rice. Millers can now meet consumer demand for rice products which are both nutritious and tasty.

As a staple food

Figure 1: Comparison of inorganic matter content



The history of germ retaining rice can be traced back to Japan as early as 1924, when Junjiro Shimazono, a professor of medicine at the University of Tokyo, put forward the theory of 'Common Use of Germ Milled Rice.'

This work provided the theoretical support for the consumption of germ milled rice as a staple food. Soon after, Satake Corporation began producing this improved rice by adjusting the design of their ordinary rice mills.

However, the rice did not have an ideal taste due to the limitations of the processing technologies at the time.

In 2006, Satake Manufacturing (Suzhou) or Satake Suzhou introduced the first generation of germ retaining rice technology to the Chinese market. The problems with taste had been solved after many technical innovations and research.

These machines are capable of processing rice to a precise degree which retains its nutritional components while largely maintaining its good flavour. The following magnified image (Picture 1) shows a sample of germ retaining rice processed by Satake Suzhou's germ retaining rice processing system.

Definition & nutritional analysis

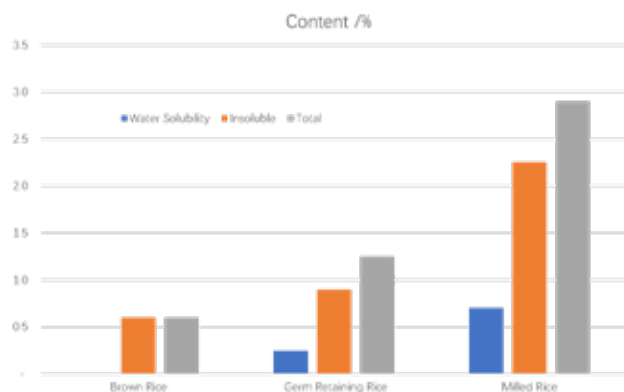
Germ retaining rice (officially called 'germ retaining milled rice') is white rice which retains its germ through a special rice milling method. It is rich in trace elements and physiological components, as well as tasting better and is easier to digest than brown rice.

Germ retaining rice maintains the excellent taste of white rice without losing nutritional value. This rice skilfully reflects the value of rice itself, bringing out its best qualities.

The nutritional characteristics of germ retaining rice were compared with those of brown rice (See Figures 1 - 3). It was found that the contents of minerals and vitamins in germ retaining rice fell somewhere between those of brown rice and white rice. The magnesium content is higher and easier to absorb than with other foods, and the contents of vitamin B and E are much higher than those in white rice.

The germ is attached at the head of each grain of rice like a

Figure 2: Comparison of vitamin content



concentrated capsule of vitamins and nutrients. The content of dietary fiber in germ retaining rice is half that of brown rice.

In white rice, dietary fibre was found to have a concentration of 0.3g/100g; in germ retaining rice it is 0.8g/100g, nearly three times greater. Because of its high fibre content, germ retaining rice can contribute to reducing constipation, obesity, diabetes, and cardiovascular diseases

Germ retaining rice also has a large amount of aminobutyric acid, which has been found to help regulate the nervous system, promote metabolism, and maintain a healthy blood pressure. Through the above analysis, the differences in nutritional characteristics between germ retaining rice and ordinary milled rice can be summarised as follows.

Germ containing rice contains:

- More tocopherols and triene tocopherols which can prevent oxidative skin damage and vascular sclerosis;
- A high fibre content which can improve gastrointestinal peristalsis and promote the excretion of toxins from the body;
- More antioxidants like ferulic acid, phytic acid, and oryzanol;
- More trace elements like magnesium, potassium, calcium, zinc, and iron.

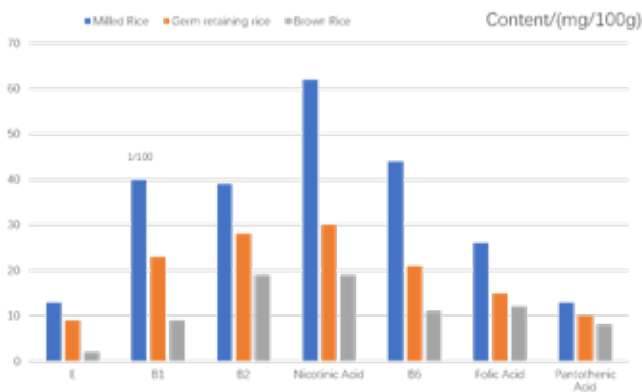
In addition to these qualities, as much as 64 percent of the nutrients of brown rice are concentrated in its aleurone layer which accounts for roughly 10 percent of its total weight. Germ retaining rice maintains this aleurone layer and also improves nutrition due to germination.

Germ retaining rice also maintains its natural vitality due to its germination power, as well as being a pure, natural, and functional food. It is of great significance in meeting consumer demands for highly nutritive, value-added rice.

Producing germ retaining rice

Is paddy suitable for processing into germ retaining rice? Presently, there is no national or industry standard for answering this question. The engineers of Satake Suzhou have a special test method to help determine whether rice is suitable to be processed into germ retaining rice:

Figure 3: Comparison of dietary fiber content



TM value = germ plumule ratio/ milling of degree;

Conditions and methods for determining TM value of germ retaining rice: Experimental milled rice machine, type TM05-C

With 60# mesh

Grinding roller speed: 855 rpm

Brown rice sample: 200g

Milling of degree:40 (Satake Milling of Meter, type:MM1E

It is found experimentally that the plumule ratio of germ retaining rice is more than 85 percent. The appearance is shiny with no spots or bran powder residue. These criteria can be used to judge a variety's suitability for processing into germ retaining rice.

For those varieties which meet these criteria, Satake Suzhou has developed a mature set of germ retaining processing technologies, which have further improved the germ retaining rate and taste quality.

In the germ retaining process, paddy cleaning, husking, and separating are the same as in traditional processing. The milling process, however, is significantly different. Satake Suzhou's professional germ retaining rice milling machine replaces the traditional rice milling unit.

This machine uses a vertical grinding method which greatly reduces the pressure of the milling chamber. By mainly grinding the bran around the grains using abrasion and cutting, this milling process rotates and reduces the radius of the rice grain without damaging the germ. The grinding effect is adjusted by changing the mill's rotary speed and changing the shape of the screen to adapt for different sized grains.

Image 3: Satake's small scale processing of germ retaining rice

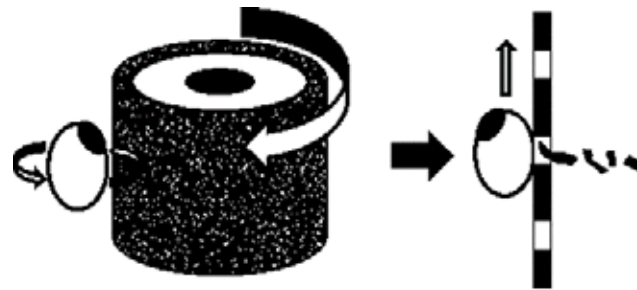


Image 2: Working principle of germ retaining rice milling

Depending on the variety of the raw material and its moisture content, the output of a single milling unit can be as large as 1500 kg/hr. For customers with smaller output requirements, a single milling machine can meet the needs for multiple varieties and qualities, reducing equipment investment and space.

For rice millers with high output requirements, mass continuous production can be reached by running multiple milling machines in series. Generally, depending on rice variety and moisture content, three-to-six machines are connected in series to produce high quality germ retaining rice.

To further improve taste, polishing machines (KB series) can also be used. The working principle of polishing is to first wet the germ retaining rice to meet a certain moisture content, and then send it to a machine which will act on it through a combination of pressure and temperature adjustments.

This process removes the bran powder on the surface of the grains and gelatinises the starch, making the rice grain crystal clear and bright.

Bringing new progress & development

The company hopes that in the future Chinese rice millers can utilise a variety of functional rice milling technologies to produce high value-added products. The development of germ retaining rice has brought new progress and development to this important staple.

Utilising advanced technologies to produce germ retaining rice can help meet the demand of China's rice market for high quality and tasty rice products.

From field to fork, Satake Suzhou aims to provide a complete solution for producing safe, reassuring, delicious, and healthy rice.

From analysis to verifying the suitability of a rice variety for processing into germ retaining rice, to the design and installation of rice production facilities, Satake Suzhou seeks to provide the equipment and expertise necessary to help any rice miller reach higher levels of quality in their final product.