

## A CONSUMER'S GUIDE TO RICE

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A very long time ago I was told, "Rice is to Asians what wine is to Europeans." If you think about it that makes a lot of sense. Wine is linked to Europe's cultures and cuisines as closely as rice is to Asia's. Both rice and wine have a myriad of varietal differences, each of which is further influenced by the environmental conditions under which the crop is grown. Just as soil type, temperature, sunlight and water determine the subtle qualities of the grape that makes the wine, they do the same to rice. Each domesticated rice variety has qualities or traits that differentiate it from all others. What are the traits that characterize rice from a consumer's perspective and how is the grain used?

### Grain Shape

Rice grains can be round to long, straight or curved. They fall into one of three basic grain shapes: short, medium, and long grain. A simple way to determine a rice variety's shape is to place a grain beside grains of the same variety that are stacked on their sides. Then count the number of grain widths it takes to equal a grain's length. This method works for un-hulled, de-hulled and milled grains alike. When the length of the grain is no more than twice its width it is short grained. Medium grain rice is characterized by its length being between two and three times its width. And, long grain rice has a length greater than three times its width. Superlatives, such as "extra", may also be used in describing the grain shape.



Photo 1. Short (A), medium (B) and long (C) grain rice in their hulls.

### Parboiled Rice

Parboiling is a method of partially cooking, or gelatinizing, the rice grain in its hull. The process provides a number of benefits to both the miller and the consumer. For the miller, gelatinization helps to mend the cracks and fissures present in the grain, and in so doing reduces breakage and improves the head rice or whole grain milling rate. Parboiling also transfers some of the nutrients located in the outer germ layer, that is milled away to make polished or white rice, into the endosperm where they remain available to the consumer. Milled parboiled rice tends to have a slight yellowish or tannish color rather than be white. It also tends to take a little more water and cooking time. When cooked, parboiled rice is less sticky than its non-parboiled counterpart.

### Milling Qualities

In addition to individual rice varieties having their own characteristic milling qualities, the conditions under which a crop is grown, harvested, dried, stored and milled will affect milling quality and contribute to the grade of the milled product.

The milling process involves more than just the mechanical removal of the pericarp from the endocarp, called whitening or polishing. It begins with cleaning the paddy or harvested grain, with hulls or husks intact, of debris. This step may or may not be followed by parboiling before de-husking or hulling. Finally, the bran is milled from the grain. On average, with modern milling equipment, de-husking removes 20% of the paddy weight. An additional 10% is removed with milling the bran from the grain, leaving 70% of the original paddy as white or milled rice. Modern rice mills also use sophisticated sorting machines that separate broken, chalky, speckled and off color grains from the whole grain head rice. A head rice output of around 55% to 60% is considered good for modern equipment while village mills may produce about 30% head rice.

In much of the world, rice is packaged and labeled according to its grade, based on its variety, the percent broken and off-color grains present. This creates a market segmentation based on grade and what the customer will or can afford to pay. In more affluent countries, it is nearly impossible to find lower grade rice in the market. In these countries, the broken and off color grains are directed to other markets such as rice flour or animal feed and pet food.

White rice quality is increased with the number of times the grain is passed through the mill and more starch layers are removed. This is a very important aspect in sake production where the liquor's quality is judged on the number of milling cycles, the rice variety used and water quality.

### Grain Color

Brown rice, also known as husked rice or cargo rice, is unmilled, has the bran attached to the grain and is the healthiest form of rice to eat. Brown rice requires more water, time and energy to cook than milled white rice.

The majority of vitamins in rice are in the bran and are lost with milling. Rice is milled because the oils in the bran readily oxidize, turn rancid and impart an off flavor. Storing brown rice in the freezer will slow the process of rancidification. Rice bran oil is one of the healthiest plant oils and is high in heart healthy tocopherols and tocotrienols which are members of the vitamin E family. Rice bran oil is extracted by some modern mills immediately after the bran is removed and can be used in high quality cooking oil, pharmaceuticals and cosmetics. The bran is also used as animal feed and would be an excellent source of vitamins and fiber if the oil were could be stabilized.

The majority of rice varieties produce white grains when milled. However, there are varieties that possess black, brown, tan, and now even golden grains after milling. Varieties with colored endosperm tend to be specialty rices associated with specific ethnic dishes.

### Rice Starch

Amylose and amylopectin are the two basic starches that make up the rice endosperm. Amylose is molecules are non-lightly branching branched chains of glucose molecules monomers. Amylopectin, on the other hand, is made up of branching chains of the glucose molecule and is more easily digested than amylose. Long grain rice typically has more amylose and is less sticky than medium and short grain rice

which tend to have progressively higher amylopectin content. Sticky or glutinous rice has very low amylose. Rice is gluten free and is considered hypoallergenic.

Rice starch can be consumed as the grain or milled into flour and used in the making of a wide variety of foods. Rice starch granules are among the smallest of starch granules and are particularly good for making puddings, confections and gravies where smoothness and texture are important. Rice starch is also used in making everything from cosmetics to tablets.

Cooked rice may also be enzymatically digested to produce rice syrup, or can be fermented to produce alcohol. Sake is the most famous of rice-based alcoholic beverages but every Asian culture seems to have their own rice liquor.

#### Enriched and Fortified Rice

Packaged rice may be labeled as either enriched or fortified. These represent two methods of adding back the vitamins and minerals to white or polished rice lost in the milling process.

Enriched rice is simply rice that has had the vitamins and minerals overcoated on all the grains. It is recommended not to wash enriched rice because that removes the vitamins and minerals in the wash water.

Fortified rice is made by blending vitamins and minerals with rice flour and extruding the dough through a granulator to create an artificial rice grain similar to milled rice. The fortified grains are then blended with the milled rice at a ratio to achieve the vitamin and mineral content desired, normally one or two fortified grains per hundred grains of milled rice. Fortified rice can be washed prior to cooking without a significant loss of vitamins and minerals.

#### Cooked Rice

No single method of cooking rice works well for all varieties and cuisines. Rice is cooked by combining it with water and heat to gelatinize the starch within the grain. The optimum amounts of ingredients, temperature and time allowed for cooking will vary with the variety, the food being prepared and the equipment and method of cooking. Other ingredients may be added before, during or after cooking to add color, flavor or texture.

As a child, my mother cooked rice on the stove in a special rice pot with a double lip. A crust of brown, crispy, partially caramelized rice would frequently form at the bottom of the pot. That layer was called "koge" (pronounced "ko-gay"), Japanese for burned, and was a favored childhood delicacy. Unfortunately, with the modern, computer programmed rice cookers koge rice is a thing of the past.

Packaged precooked rice dishes are now on the market that only need to be reheated by placing the package in boiling water or the microwave before eating.

#### The Taste of Rice

The taste of rice is the marriage of two senses: flavor and texture. Simply put, taste buds in the mouth and aroma receptors in the nasal cavity detect chemicals that impart flavor while the ratio of amylose to amylopectin contribute to the texture or mouth feel of cooked rice.

The combination and concentration of a wide variety of chemicals determines the flavor of rice. The majority of rice varieties are non-aromatic and have subtle flavors that do not rely on aroma. Their

flavors are imparted by the cooking process and digestion of the starches into sugars by saliva. Aromatic rice varieties, on the other hand, derive much of their distinctive nutty flavors from the mixture of volatile chemicals. While certain ethnic dishes are identified with specific aromatic rice varieties, processed foods that utilize rice as a raw material, such as cereal, ice cream, custards, rice milk, beer and sake, all want, for lacking lack of a better word, “tasteless” rice.

Texture is the feel in the mouth and plays a more important role in the perception of taste than is commonly thought. The texture of cooked rice is dependent on the ratio of amylose and amylopectin, cooking time, temperature and amount and quality of water used in the cooking process. Cooked rice can run a wide gamut of textures. It can be waxy, al dente, sticky, smooth or creamy.

When other liquids, such as milks or creams, are used in cooking rice, they can add another level of complexity to the flavor and texture of the rice.

At times I'm asked what my favorite rice variety is. I always reply that I have no favorite; it depends upon what I am eating. Just as Basmati or Jasmine rice will not make good sushi or donburi, Nihonbare rice does not make the best Biryani rice or khao pad gai. Each variety was developed for the consumer within a specific culture and cuisine. That being said, it gets down to personal preferences. Does that not hold true for wine as well?