



RICE AS A FOOD RAW MATERIAL: CORRELATIONS BETWEEN VARIETY, PROCESSING TECHNIQUES, CULINARY PRACTICES AND NUTRITIONAL AND FUNCTIONAL VALUE

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Abstract: Rice (*Oryza sativa* L.) is a staple food consumed worldwide and an important source of nutrients. This study reviews the influence of rice variety, processing, and cooking methods on nutritional and functional properties. Brown and pigmented rice varieties showed higher contents of fibers, minerals, and bioactive compounds compared to white rice, while amylose content influenced digestibility and glycemic response. Processing and cooking methods significantly affected nutrient retention and antioxidant activity. In addition, rice is characterized by high culinary versatility, serving as a key ingredient in a wide range of traditional and modern dishes such as pilaf, paella, risotto, sushi, and biryani, as well as desserts like rice pudding and kheer. Cooking methods and post-preparation treatments, including cooling and reheating, may alter starch structure and the metabolic impact of consumption. Overall, the nutritional value of rice depends on the interaction between variety, processing, and culinary preparation.

• Introduction

Rice (*Oryza sativa* L.) is one of the most important staple foods worldwide and an essential source of energy and nutrients. Recent studies highlight the superior nutritional value of brown and pigmented rice due to their high content of fibers, minerals, phenolic compounds, and antioxidants. Nutritional quality is strongly influenced by processing degree, amylose content, and cooking methods.

• Material and method

This study represents an integrative literature review based on scientific articles published between 2021–2025 regarding the nutritional, functional, and biochemical properties of rice. The selected studies evaluated the effects of rice variety, processing, cooking methods, germination, and amylose content on nutritional quality, antioxidant activity, mineral composition, digestibility, and glycemic response.

• Results and discussions

The analyzed studies demonstrated significant nutritional differences between white, brown, and pigmented rice varieties. Brown rice retained higher amounts of proteins, fibers, vitamins, and minerals due to the preservation of bran and germ layers. Pigmented rice, especially black and red varieties, showed the highest concentrations of anthocyanins, flavonoids, and phenolic compounds, resulting in superior antioxidant activity and important functional properties.

Processing methods such as milling and polishing significantly reduced micronutrient content, antioxidants, zinc, iron, and B-group vitamins. Cooking methods also influenced nutritional quality. Boiling caused major losses of proteins, carbohydrates, and amylose, while microwave cooking better preserved nutrients and bioactive compounds. Germination improved GABA, vitamin, and fiber content, while high-amylose rice varieties exhibited lower starch digestibility and reduced glycemic response.

Rice is used in many dishes and is a staple ingredient in the cuisines of many countries.

Arroz a la Cubana is a dish originating in Spain, inspired by Cuban cuisine. It is characterized by a combination of plain white rice served with ingredients such as fried plantains, meat (beef or sausage), and a fried egg on top. The dish stands out for the contrast between sweet (the plantains), salty (the meat), and the soft texture of the rice, offering a balance of flavors and colors on the plate. The dish uses white rice, with long or medium grains; it is rich in carbohydrates due to the rice, in protein and fat due to the meat and fried eggs, but low in fiber.

Paella is a rice dish originating from the Albufera Lake region in Spain. It uses medium-grain or round-grain white rice, which absorbs liquids and flavors well.

In addition to rice, the dish traditionally includes saffron, which gives the rice its distinctive yellow color, olive oil, and vegetables that add flavor. Paella can be prepared in several variations, such as: Valencian paella (with chicken, rabbit, green beans, tomatoes, olive oil, saffron, and other spices), paella de mariscos (with seafood), and mixed paella (a combination of meat and seafood). (figure 1)



Valencian paella
Source: <https://en.wikipedia.org/wiki/Paella>

Figure 1 Paella
Paella de mariscos
Source: <https://percutti.com/recetas-de-paella-de-marisco>

Mixed paella
Source: <https://www.annonamats.com/grilled-paella-mixed-mixed-paella-with-chicken-and-seafood>

Sushi is a traditional Japanese dish characterized by wrapping rice around various ingredients, such as raw or cooked fish, seafood, vegetables, and sometimes eggs. Short-grain Japanese rice (which becomes sticky after cooking) is used, cooked with a mixture of rice vinegar, sugar, and salt, giving it a mild acidity and a sticky texture, which is essential for forming the rolls. There are several types of sushi, the most popular of which—those containing rice—are nigiri (slices of fish placed on a small mound of rice), maki (rolls of rice and ingredients wrapped in nori seaweed), and temaki (cone-shaped rolls, held in the hand). The main ingredients of sushi include raw fish (salmon, tuna), seafood, vegetables (avocado, cucumber, carrot), nori seaweed, sauces (soy sauce, wasabi), and, sometimes, Japanese omelet (tamago). (figure 2)



Nigiri
Source: <https://backlistyca.com/low-to-make-nigiri-sushi/>

Figura 2 Sushi
Maki
Source: <https://ichiyodasushi.vn/en/kuva/kuva-of-sushi/>

Temaki
Source: <https://ichiyodasushi.vn/en/kuva/kuva-of-sushi/>

Kheer is a traditional Indian dessert, similar to rice pudding, that is very popular in India, Pakistan, and other South Asian countries. The dessert consists of a mixture of rice (short-grain white rice), milk, sugar, and spices (cardamom, saffron, and sometimes nutmeg), and is a dish associated with holidays and religious events. Kheer is served with roasted nuts, almonds, or pistachios.

• Conclusions

Brown and pigmented rice present important nutritional and functional advantages over white rice due to their higher content of fibers and bioactive compounds. Processing and cooking methods significantly affect nutrient retention and glycemic impact. Promoting whole and pigmented rice consumption may contribute to reducing the risk of metabolic diseases and improving dietary quality. With its ability to blend tradition and modernity, rice has established itself as a universal ingredient, capable of uniting different culinary worlds and inspiring new creative directions in gastronomy.