



Rice and human nutrition

Rice provides 20 percent of the world's dietary energy supply. It is also a good source of thiamine, riboflavin, niacin and dietary fibre. Unmilled rice contains more nutrients than milled or polished white rice.

Rice forms an integral part of the culinary traditions of many different cultures, each of which has its own particular set of preferences regarding the texture, taste, colour and stickiness of the rice that they eat.

The nutrient content of rice can be improved by using both traditional selective plant breeding techniques and new technologies, such as modification of the plant's genetic code.

In 1995, the Codex Alimentarius Commission adopted safety and quality criteria for the rice that is produced for human consumption: the Codex Standard for Rice.

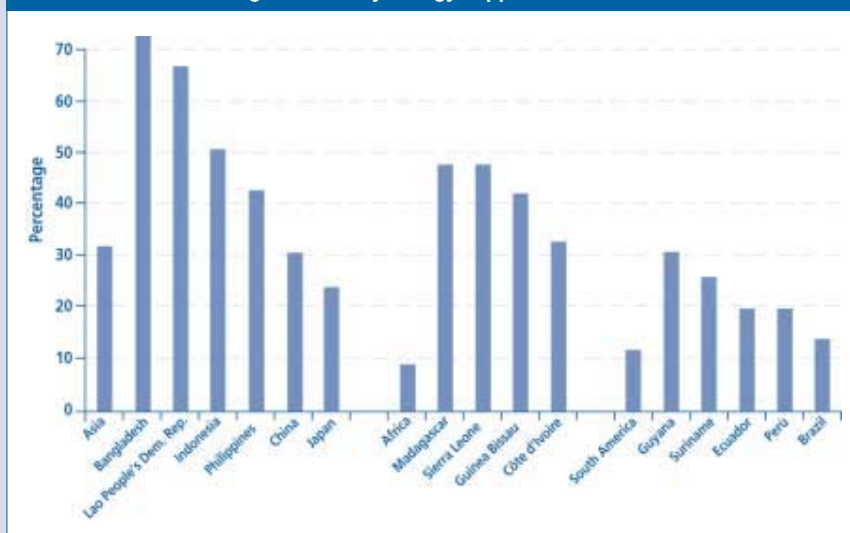


THE SITUATION

Rice is the predominant staple food for 17 countries in Asia and the Pacific, nine countries in North and South America and eight countries in Africa. Rice provides 20 percent of the world's dietary energy supply, while wheat supplies 19 percent and maize 5 percent. Figure 1 illustrates the contribution of rice to dietary energy supply in different regions of the world.

In addition to being a rich source of dietary energy, rice is a good source of thiamine, riboflavin and niacin. Unmilled rice contains a significant amount of dietary fibre. The amino acid profile of rice shows that it is high in glutamic and aspartic acid, while lysine is the limiting amino acid. Rice alone cannot supply all of the nutrients necessary for adequate nutrition. Animal products and fish are useful additions to the diet as they provide large amounts of essential amino acids and micronutrients. Pulses, such as beans, groundnuts and lentils, are also nutritional complements to the rice-based diet and help to complete the amino acid profile. Many traditional dishes throughout the world combine these ingredients to achieve better nutritional balance. Fruits and green leafy vegetables are also added to enhance dietary diversity and supply essential micronutrients.

FIGURE 1. Percentages of dietary energy supplied from rice in selected areas



A COLOURFUL AND VARIED FOOD

Rice is rich in genetic diversity, with thousands of varieties grown throughout the world. In its natural unmilled state rice comes in many different colours, including brown, red, purple and even black. These colourful rice varieties are often prized for their health properties. Unmilled rice has a higher nutrient content than milled or polished white rice (Table 1).

For many cultures, rice forms an integral part of the culinary tradition. Different cultures have different preferences regarding the taste, texture, colour and stickiness of the rice varieties that they consume. For example, dry flaky rice is eaten in South Asia and the Middle East; moist sticky rices in Japan, Taiwan Province of China, the Republic of Korea, Egypt and northern China; and red rice in parts of southern India. Many countries have signature rice recipes, such as sushi, fried rice, curry, paella, risotto, pancit, and beans with rice. There are also many sweets and candies made from rice.



TABLE 1. Nutrient contents of rice varieties

Type of rice	Protein (g/100g)	Iron (mg/100g)	Zinc (mg/100g)	Fibre (g/100g)
White – polished ^a	6.8	1.2	0.5	0.6
Brown ^a	7.9	2.2	0.5	2.8
Red ^b	7.0	5.5	3.3	2.0
Purple ^b	8.3	3.9	2.2	1.4
Black ^a	8.5	3.5	-	4.9

Sources: ^a = Association of Southeast Asian Nations (ASEAN) food composition table; ^b = Chinese food composition table.



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IMPROVING THE NUTRIENT CONTENT OF COMMON RICE VARIETIES

There is a new research impetus towards improving the nutritional status of populations through making improvements to staple crops. The following are two of the various techniques that are being used to accomplish this goal:

- Traditional plant breeding techniques use selected rice varieties with superior nutrient content and breed these with the most commonly grown

varieties to enhance the nutrient content of the grains.

- Recent breakthroughs in scientific technology have made it possible to enhance the nutritional value of rice through modifying the genetic code. The best-known example of this technology is “golden rice”, which contains added carotenoids (precursors to vitamin A) from daffodil genes.

RICE AND FOOD SAFETY

In many regions of the world, rice is the most important part of the human diet, so the consumer's daily bowl of rice needs to be safe and of good quality.

Appropriate good agricultural practices need to be applied when growing rice and controlling pests.

After harvesting, efficient on-farm processing, storage and distribution should ensure that the quality does not deteriorate through, for example, the growth of fungi resulting from inadequate drying of the grain.

In 1995, the Codex Alimentarius Commission agreed to adopt safety and quality criteria for the rice that is produced for human consumption (Codex Standard for Rice). Other Codex work sets maximum limits for pesticide residues and

discusses possible limits for certain heavy metals such as cadmium and mycotoxins. These standards for rice are accepted by the World Trade Organization (WTO), so the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) take care to ensure that they have a sound scientific basis.

The Joint FAO/WHO Expert Committee on Food Additives (JECFA) and the Joint FAO/WHO Expert Meeting on Pesticide Residues address the issues that influence the safety and quality of rice. Their work includes advising member countries and Codex on good agricultural and manufacturing practices for growing and processing rice.



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