

HISTORY OF RICE IN THE USA

From The US Rice Federation



Rice, throughout history, has been one of man's most important foods. Today, this unique grain helps sustain two-thirds of the world's population, yet little is known about the origins of rice cultivation. Archeological evidence suggests rice has been feeding mankind for more than 5,000 years. The first documented account is found in a decree on rice planting authorized by a Chinese emperor about 2,800 BC. From China to ancient Greece, from Persia to the Nile Delta, rice migrated across the continents, eventually finding its way to the Western Hemisphere.

Enterprising colonists were the first to cultivate rice in America. It began quite by accident when, in 1685, a storm-battered ship sailing from Madagascar limped into the Charles Towne harbor. To repay the kindness of the colonists for repairs to the ship, the ship's captain made a gift of a small quantity of "Golden Seede Rice" (named for its color) to a local planter.

The low-lying marsh lands bordered by fresh tidal water rivers of the Carolinas and Georgia proved to be ideal for rice production. The soils were rich, reasonably flat and highly fertile. They also were so soft a man could hardly stand on them, with twice a day tides pushing fresh river waters onto the flood plains, nothing else could be grown there.

By 1700, rice was established as a major crop for the colonists. That year 300 tons of American rice, referred to as "Carolina Golde Rice," was shipped to England. Colonists were producing more rice than there were ships to carry it.

By 1726, the Port of Charleston was exporting about 4,500 metric tons of "Carolina Golde," which later became the standard of high-quality rice throughout the world. When America gained independence 50 years later, rice had become one of her major agricultural businesses. Then came the War Between the States and an end to the plantation era. This, together with the ravages of hurricanes and competition from other crops, moved rice westward. The sprawling plantations of the Gulf Coast, parceled out to soldiers returning from the war, became a new home to rice crops. Still, high labor costs kept the industry from expanding. Not until mechanized farming methods came into use would the Gulf Coast rice industry become viable.

In 1884, the Machine Age was beginning to affect every aspect of American life. It was the year an Iowa wheat farmer pointed out that the broad prairie land of southwestern Louisiana and southeastern Texas has solid soils which could hold up heavy equipment like the machines used for the production of wheat in Iowa. A revolution of mechanization followed, establishing what are today's major Southern rice growing states: Arkansas, Louisiana, Mississippi, Missouri, and Texas.

Meanwhile, the 1849 gold rush brought people from all nations to California. Among them were an estimated 40,000 Chinese, whose staple food was rice. To feed the immigrants, rice production became a necessity. Farmers in the Sacramento Valley found rice would adapt well to heavy clay soil conditions that were largely unsuited to other crops. By 1920, California was a major rice-producing state. More recently, farmers of Southern Florida began growing rice.

Technological improvements have evolved over the years to make American rice production the most efficient and advanced in the world. New mechanization and techniques have helped the American rice farmer reduce the costly time spent in the field to only seven man-hours per acre. Some Asian countries continue to require 300 man-hours per acre.

From its meager beginnings in South Carolina, rice has become a major U.S. agricultural product. Nearly 90 percent of the rice consumed in the United States is produced within its borders. Today, the United States is the world's most advanced, innovative rice producers. One of the largest exporters of rice in the world, the United States is respected worldwide for its abundant production of high-quality rice.

RICE CULTIVATION



American farmers consistently produce a dependable supply of the highest quality rice in the world. Long gone are the days of ox- and mule-drawn equipment in the marshes of South Carolina. Gone too is the reliance upon seasonal rains, as is still the case in many other rice-producing countries. Rice farming in America has become a precise science, a world of specialized equipment, lasers and computers.

Today, land planes scrape and shift the soil to level the land. Heavy equipment makes light work of building even fields that gently slope, enabling uniform flooding and controlled draining. Laser guidance systems determine where water control levees will be placed. In early spring, acres of seeds are quickly planted to an exact depth by grain drills, or cast over dry or flooded fields by airplane. Gravity guides fresh water, pumped from deep wells, nearby rivers, canals or reservoirs to provide a constant water depth on the field of 2 to 3 inches during the growing season. And, to ensure a consistent and healthy crop, fertilizers are evenly applied from the air.

When the rice is mature, the water is drained from the fields. Sophisticated combines cut the rice, separating the grain from the stalk, and funnel it into trucks for transporting to dryers. At large commercial installations or small drying facilities on the farm, forced warm, dry air gradually removes moisture from the grain to a level suitable for storage. When sold, the rice will be transported to a rice mill.

MILLING



When rice arrives at the mill, it is ushered through a series of sorting machines, separating the kernels encased in an inedible hull or husk, from any debris. The rice is then sent on its way through the multifaceted processing journey.

The rough rice passes through "sheller" machines that remove the hull. What remains is brown rice, with the bran layers still surrounding the kernel. The grains of brown rice are milled by machines that rub the grains together under pressure. This abrasion removes the bran layer, revealing white or "polished" rice. Some American mills produce parboiled rice, favored by those who desire rice that is an extra separate, firmer grain when cooked. Parboiling is a steam pressure process in which rough rice is soaked, steamed and dried before milling. Milled white rice, at its best, is made up of clean, polished, whole kernels. Many U.S. rice mills use laser sorters that look for broken or discolored kernels and sort them from the whole kernels of rice. Technology has enabled the U.S. rice industry to consistently produce a high-quality product. The modern technology employed by American rice producers is, in part, responsible for the reputation for U.S. rice's reputation for high quality around the world. The fact that the United States is one of the world's largest exporters of rice attests to its broad appeal. An equally impressive fact is that more than 90 percent of the rice consumed in the United States is produced within its borders.

RICE FARMING



Rice farmers put to good use soils that may otherwise be unsuitable for farming. Heavy clay soils that hold water, a difficult environment for some crops, are perfectly suited for rice.

As rice grows to maturity, the flooded fields serve as holding ponds, which prevent soil erosion from rain runoff or the blowing away of dry soil. Some farmers have begun to employ new recirculating irrigation systems and automated shutoff valves that conserve up to two-thirds the water requirements of 30 years ago.

After harvest, the fields are covered with a carpet of rice straw, a seemingly useless residue. Today researchers are finding new uses for the straw, including soil incorporation techniques, uses in building materials and mulches, and as a resource for energy.

While creating the proper conditions for rice straw decomposition, the winter flooding of rice fields has become a vital sanctuary and food source to migratory waterfowl and other wildlife.

Rice growers are cooperating with conservation groups and government agencies to farm in ways that compensate for the loss of natural foods, no longer found in sufficient quantities to sustain healthy waterfowl populations.

The abundant supply of rice, insects and roots provided by the rice fields is proving to enhance these populations.

RICE TYPES



Worldwide there are more than 40,000 different varieties of rice, though only a small number offer the quality acceptable to be grown commercially in the U.S.

In the United States, these varieties can be divided into long, medium, and short grain. Limited waxy rice and arborio is produced, as well as some aromatic and specialty varieties.

The primary differences in these rices is their cooking characteristics and, in some cases, a subtle flavor difference.

From a nutritional standpoint they are equal and indeed can often (with the exception of waxy rice or arborio) be interchanged in recipes.

MAIN RICE TYPES

● BROWN RICE (HUSKED RICE)

Paddy from which only the external and non-edible husk has been removed. The bran layer remains, making it more nutritive than white rice. In Europe, this type of rice is often called "cargo rice" because of the way it is transported by sea. Frequently green kernels are found with the brown rice as grain maturation is not homogeneous. In addition, more than one variety may be planted in the same field. Separating the grains before or after harvesting is difficult and expensive. There are also green grains in the white rice, but they are less visible because of the more intensive husking process.

● WHITE RICE

Milled and polished kernel which loses many of its nutrients when the outer layer (the husk and bran layer) is removed. It contains much less niacin, thiamin, magnesium, zinc, iron and fiber than the brown rice. In some countries, including the United States, white rice may be enriched with iron, niacine and thiamine so that it

can reclaim part of its original nutritive value. White rice may be covered with magnesium silicate or with a mixture consisting of talc and glucose (also known as "talc-coated rice").

● **RED RICE**

Red rice has a red bran covering the kernel (Himalayan, Bhoutanais or Thai).

- Black rice: has a black thin bran covering a white grain. It comes from Bali, China or Thailand.

● **OTHERS**

• Arborio rice is a white and round grain, considered one of the finest rices because it can absorb a high quantity of liquid while cooking, without becoming soggy.

• Aromatic rice (naturally aromatized) has more flavor than the other varieties. The Basmati rice, cultivated in India and Pakistan, is the best known and most appreciated. It is indispensable in Hindu cooking, and has a light and dry texture and an aromatic taste. Jasmine rice grows in Northeast Thailand (Isarn region) and is also appreciated worldwide.

KERNEL SIZES

- **Long grain rice kernels** are 3 times longer than they are wide (more than 6 mm). When cooked, this grain is light and separates easily. There are also glutinous long grain rices in Laos and Thailand.

- **Medium grain rice kernels** are 2 or 3 times longer than wide (5 to 6 mm), being shorter and wider than the long grain.

- **Short or round grain rice kernels** look almost as long as wide (4 to 5 mm long and 2.5 mm wide).

• Long grain rice: Basmati from India and Pakistan, Jasmine White Rice from Thailand and Ferrini from Italy;

• Medium and short grain: Arborio, Carnaroli, Vialone, Nano

LONG

Long grain rice has a long, slender kernel, four to five times longer than its width. Cooked grains are separate, light and fluffy.



MEDIUM

Medium grain rice has a shorter, wider kernel (two to three times longer than its width) than long grain rice. Cooked grains are more moist and tender, and have a greater tendency to cling together than long grain.



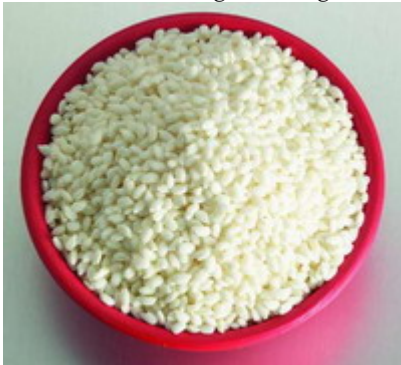
SHORT

Short grain rice has a short, plump, almost round kernel. Cooked grains are soft and cling together.



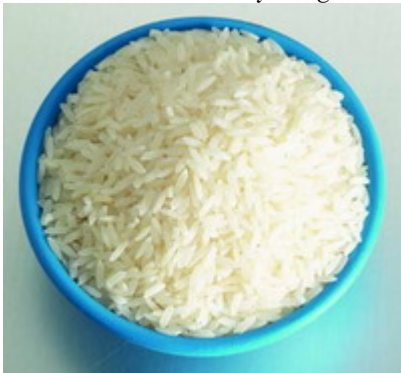
SWEET or WAXY

U.S. sweet rice is short and plump with a chalky white, opaque kernel. When cooked, sweet rice loses its shape and is very glutinous. Sweet is more often used in commercial product formulations. The starch and flour from sweet rice is used in frozen products as a binder for gravies, sauces, and fillings because it is resistant to breakdown during freezing and thawing, unlike some corn or wheat starches.



AROMATIC

Aromatic rices have a flavor and aroma similar to that of roasted nuts or popcorn. The natural compound that gives aromatic rice the characteristic aroma and flavor is present in all rice, but in the aromatic varieties it is present in much higher concentrations. The most popular domestically grown aromatic rices include: della which cooks dry, separate and fluffy; jasmine which cooks more moist and tends to cling together; and basmati which cooks into very long, slender grains which are dry, separate and fluffy.



US ARBORIO

U.S. arborio rice is a large, bold rice with a characteristic white dot at the center of the grain. By the way of length/width ratio and starch characteristics, it is classified as a medium grain rice. Primarily used in risotto, this rice develops a creamy texture around a chewy center and has exceptional ability to absorb flavors.



RICE FORMS

The influx of convenience foods has brought consumers rice in bags, cans and cartons. Rice can be purchased cooked or uncooked, canned, dehydrated and also frozen. Few foods are packaged so extensively and are offered in so many combinations as rice. To meet the many special requirements of packaged foods, rice undergoes varying degrees of processing, including regular-milled, parboiled, precooked, and brown.

ROUGH (PADDY) RICE

Kernels still within the hull. Before the rice can be packaged or cooked, the outer hull or husk must be removed.



BROWN RICE

Kernels of rice from which only the hull has been removed. Brown rice may be eaten as is or milled into white rice. Cooked brown rice has a slightly chewy texture and a nut-like flavor. The light brown color of brown rice is caused by the presence of bran layers which are rich in minerals and vitamins, especially the B-complex group.



REGULAR-MILLED WHITE RICE

Regular-milled white rice, often referred to as “white” or “polished” rice is the most common form of rice. The outer husk is removed, and the layers of bran are milled until the grain is white.



PARBOILED RICE

Rough rice that has gone through a steam-pressure process before milling. This procedure gelatinizes the starch in the grain, and ensures a firmer, more separate grain. Parboiled rice is favored by consumers and chefs who desire an extra fluffy and separate cooked rice.



PRECOOKED RICE

White or brown rice that has been completely cooked and dehydrated after milling. This process reduces time required for cooking.



SPECIALTY VARIETIES

Aromatic rices have a natural aroma and flavor similar to that of popcorn or roasted nuts. Popular aromatic varieties grown in the United States include:

U.S. aromatic red rice has a deep, honey-red bran. Like brown rice, it is minimally processed to retain its bran layers and takes 45 to 50 minutes to prepare. Cooked grains have a savory, nutty flavor and are slightly chewy.

U.S. basmati rice is an aromatic long grain rice that has a distinctive aroma and flavor similar to that of popcorn or roasted nuts. When cooked, it swells only lengthwise, resulting in long slender grains that are dry, separate and fluffy.

Della, Delrose, and Delmont varieties combine the qualities of regular long grain rice and basmati rice. They have an aroma similar to basmati. However, cooked grains swell in both length and width, like regular long grain rice.

U.S. black japonica is an aromatic rice with a dark black bran. Like brown rice, it is minimally processed to retain its bran layers and takes 45 to 50 minutes to prepare. Cooked grains are slightly chewy with a subtle sweet spiciness.

U.S. jasmine rice is an aromatic long grain rice that has a distinctive aroma and flavor similar to that of popcorn or roasted nuts. Cooked grains are soft, moist and cling together.

U.S. sweet rice is short and plump with a chalky white, opaque kernel. When cooked, sweet rice loses its shape and becomes very sticky and glutinous.

U.S. arborio rice is a large, bold rice with a characteristic white dot at the center of the grain. By way of length/width ratio and starch characteristics, it is classified as a medium grain rice. Primarily used in risotto, this rice develops a creamy texture around a chewy center and has exceptional ability to absorb flavors.

RICE PRODUCTION



- Approximately 88 percent of the rice consumed in the United States is grown in the United States.
- The U.S. has been growing and exporting rice in what is now the United States for over 300 years.
- The United States is one of the largest exporters of rice, supplying more than 13 percent of the rice that enters world trade. This figure reflects the fact that most of the rice producing countries consume all or most of their production at home, and very little of it enters international trade.
- Nearly half of the U.S. rice crop is exported to over 100 countries.
- Rice is one of the United States' oldest agribusinesses, dating back to 1685.
- There are thousands of different varieties of rice (*Oryza sativa*). At the International Rice Research Institute Genetic Resources Center in the Philippines, there are 80,000 rice samples in cold storage.
- Rice is grown on every continent except Antarctica.
- One seed of rice yields more than 3,000 grains. It is the highest yielding cereal grain and can grow in many kinds of environments and soils, which is why it is grown everywhere.
- Rice is a perennial. If the plant is properly cared for, it can last 20 years, producing thousands of grains each year.
- The major rice-producing states are: Arkansas, California, Florida, Louisiana, Texas, Mississippi, and Missouri.

World's Top 5 Rice-Exporting Countries in 2004

Source: USDA/FAS Grain World Markets and Trade, April 2005

Country	Volume
Thailand	10,137,000 MT
Vietnam	4,295,000 MT
India	3,100,000 MT
United States	3,097,000 MT
Pakistan	1,900,000 MT

Top 10 World Markets for U.S. Rice in 2004

Source: USDA/FAS (Export Data)

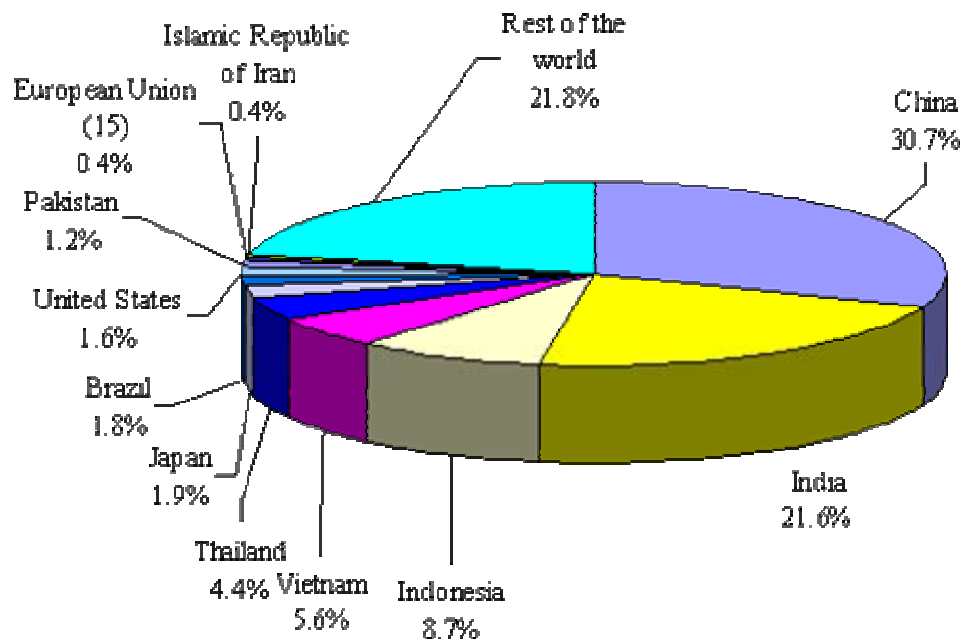
Market	U.S. Exports (milled rice equivalent)
Mexico	538,800 MT
Japan	397,600 MT
Haiti	271,500 MT
Canada	200,600 MT
Cuba	180,500 MT
Brazil	154,200 MT
Philippines	111,200 MT
Costa Rica	110,300 MT
United Kingdom	94,800 MT
Honduras	94,200 MT

Rice is the second largest produced cereal in the world. At the beginning of the 1990s, annual production was around 350 million tons and by the end of the century it had reached 410 million tons. World production totaled 395 million tons of milled rice in 2003, compared with 387 million tons in 2002. This reduction since the end of the previous millennium is explained by the strong pressure put on land and water resources, which led to a decrease of seeded areas in some Western and Eastern Asian countries.

Production is geographically concentrated in Western and Eastern Asia with more than 90 percent of world output. China and India, which account for more than one-third of global population (52,3% over the 1999-2003 period), supply over half of the world's rice. Brazil is the most important non-Asian producer, followed by the United States. Italy ranks first in Europe.

World production has shown a significant and very steady growth, almost exclusively due to increasing production in Western and Eastern Asia.

Distribution of the world paddy rice production (average 1999-2003)



Source : UNCTAD Secretariat from the Food and Agriculture Organization of the United Nations (FAO) data

Growth has not been homogeneous in this group of countries. Traditionally, production in Asian increases, except in Japan. The decrease in Asian production at the end of the 1990s did not get enough attention as it was considered to be a temporary abnormality. However, it has now begun to seriously affect some countries such as China where rice areas have declined as a consequence of water scarcity and competition from more profitable crops (oleaginous). Despite this trend, rice still plays a vital role in all the countries in the region.

CONSUMPTION

World rice consumption increased 40 percent in the last 30 years, from 61,5 kg per capita to about 85,9 kg per capita (milled rice).

Three consumption models can be distinguished:

- **Asian model:** average consumption higher than 80 kg/person per year (China: 90kg, Indonesia: 150kg, Myanmar: more than 200kg, the record);
- **"PVD subtropical"** model: average consumption between 30 and 60 kg/person per year (Colombia: 40kg, Brazil: 45kg, Ivory Coast: 60kg);
- **West model:** average consumption lower than 10 kg/person per year (France: 4kg, United States: 9kg).

Most rice is consumed in the same country that it is produced. This is one of the most important characteristics of the rice production chain. Domestic rice markets are, therefore, very segmented and often one of the most protected.

INTERNATIONAL TRADE

International rice trade is estimated between 25 and 27 million tons per year, which corresponds to only 5-6 percent of world production. It makes the international rice market one of the smallest in the world compared to other grain markets such as wheat (113 million tons) and corn (80 million tons).

Besides the traditional main exporters (Thailand, Vietnam, India and Pakistan), a relatively important but still limited part of rice traded worldwide comes from developed countries in Mediterranean Europe and the United States. There are two major forces behind this: new food habits in developed countries and new market niches in developing countries.

More than two thousand varieties of rice are grown throughout the world.

The International Rice Research Institute (IRRI) in the Philippines holds more than 83,000 varieties in its gene bank.

The differences are related to morphology of the plants and grains, resistance to falling, precocity, ramification, productivity, as well as resistance and tolerance of biotic factors (weeds, diseases and insects) and non-biotic factors (cold, drought, soil acidity, lack of mineral components, etc).

*** THE MARKET OF HIGH-QUALITY RICE** with a low percentage of broken grains (less than 10%) is dominated by Thailand, Vietnam and the United States growers whose production essentially meets the market demands of developed countries.

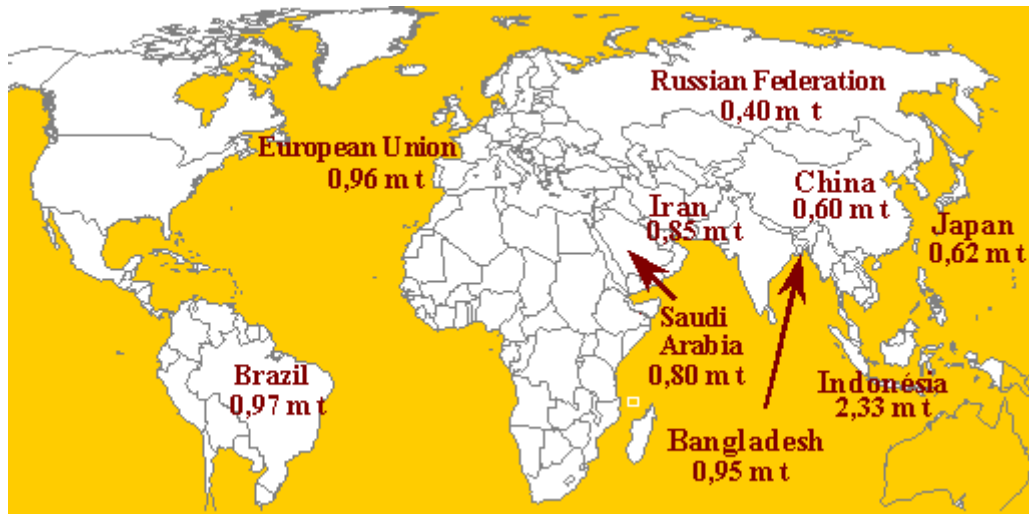
*** THE MARKET OF LOWER-QUALITY RICE** (more than 10% of broken kernels) is dominated by exporters from Asia region (Thailand, Vietnam and India) who mainly meet the market demands of developing countries in Africa, Latin America and Asia.

- **Medium-quality rice:** 15-20% broken

- **Low-quality rice:** 25-35% broken up to 100% broken.

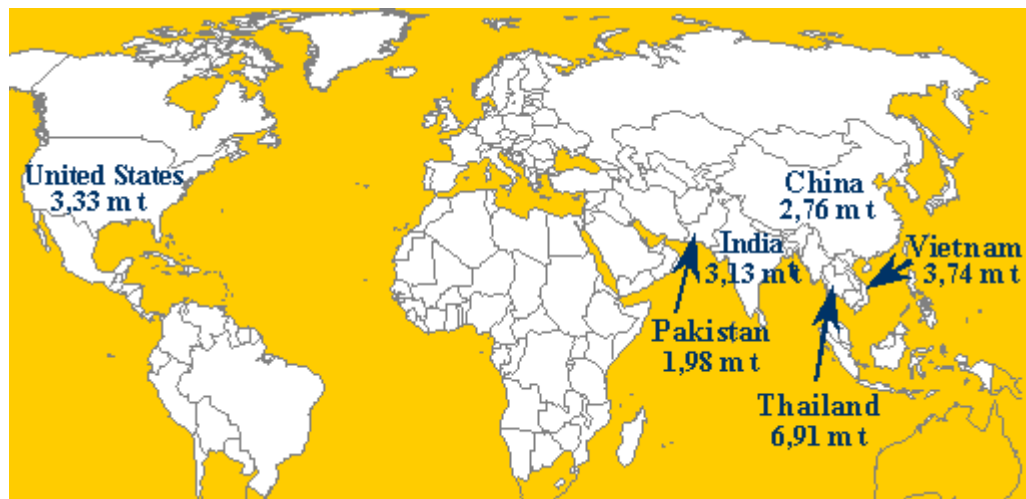
Any irregularity (yellow or chalky kernels and foreign matter) reduces the rice quality grade.

World's main importers of rice (all types), average from 1998 to 2002, in millions of tons



Source : UNCTAD Secretariat from the Food and Agriculture Organization of the United Nations (FAO) data

World's main exporters of rice (all types), average from 1998 to 2002, in millions of tons



Source : UNCTAD Secretariat from the Food and Agriculture Organization of the United Nations (FAO) data

The Middle East is the leading import and export region, accounting for 35 percent of the world's rice imports and about 75 percent of total exports.

It is projected that the global market will increase 3 percent per year over the mid to long term. However, there are uncertainties about this projection because importers, normally low to lower-middle income countries, have vulnerable economies.

The map below shows the main importers and their suppliers. Each color represents an importer (either a country or a group). The values correspond to imports of different types of rice (paddy, brown, white, broken), in thousands of dollars. The major importers are Indonesia, Bangladesh, Nigeria, the Philippines, Iraq and Brazil.

Imports value of all types of rice for main importing countries in thousand \$US (average 1999-2003)

