

PART I: WHAT IS RICE – HISTORY & PRODUCTION

OBJECTIVES

After completing this section students will be able to:

- Outline the history of rice’s diffusion throughout the world
- Understand the evolution of the U.S. rice industry and the states that currently produce rice
- Understand and define the components of a rice kernel
- Describe traditional and modern methods for cultivating and harvesting rice
- Describe major steps in the milling process
- Differentiate between the different forms of rice and explain how these forms correspond to the steps of the milling process

LESSON PLAN

Topic	Suggested Activity	Suggested Time
What is Rice?	Lecture/Discussion	5 min
U.S. Rice History	Lecture/Discussion Demonstration to trace the worldwide spread of rice, arrival in America and the U.S. rice industry	5 min 10 min
Rice Production	Lecture/Discussion	15 min
Cultivation	Class Activity: Draw a flowchart tracing the different processing steps	10 min
Milling		



WHAT IS RICE?

Rice is the seed of a semi-aquatic grass (*Oryza sativa*) that is cultivated extensively in warm climates in many countries, including the United States, for its edible grain. It is a staple food throughout the world.

Is Wild Rice a Variety of Rice?

Wild rice is an aquatic grass species native to North America. Although it is called “rice,” it is not actually related to the rice species *Oryza sativa*, and is therefore not technically rice.

In the U.S., wild rice is grown primarily in Minnesota and California. Wild rice is a whole grain and is an important ingredient in rice blends making it popular in foodservice, so it will be referenced in this guide.

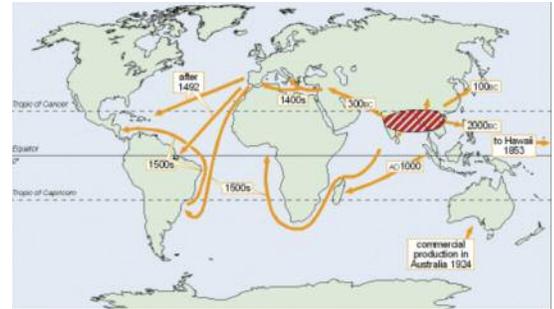
RICE AND THE ENVIRONMENT

Rice growing is eco-friendly and has a positive impact on the environment. Rice fields create a wetland habitat for many species of birds, mammals and reptiles. Without rice farming, wetland environments created by flooded rice fields would be vastly reduced.

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U.S. RICE HISTORY

- Rice was originally cultivated in the area between India and China as far back as 2000 BC.
- Short grain rice developed in the Yangtze River valley in south-central China, and long grain varieties in the Indian sub-continent. Rice production gradually moved to Southeast Asia, Persia (Middle East), Europe and Africa, and then to America.
- Rice first arrived in North America in the late 1680s, most likely from Madagascar. Lore has it that a storm-battered ship sailed into harbor in Charles Towne, South Carolina. To repay the colonists for repairs to his ship, the captain gave a small quantity of “Golden Seed Rice” to a local planter.
- The low-lying marshlands of the Carolinas and Georgia were ideal for rice production. By 1700, rice was a major crop for the colonists. Carolina Gold rice, now a small heirloom crop, soon became Europe’s most sought-after rice.
- Following the Civil War, rice production in the Carolinas and Georgia gradually ended due to hurricanes and economic conditions.
- Over the 300 years since the U.S. rice industry began, rice production gradually moved westward, taking root in today’s mid-south and gulf coast rice-producing areas. In California, the 1849 Gold Rush brought people from all nations, many of whom were rice eaters. By 1920, Sacramento Valley farmers had established the California rice industry.



Over the centuries rice cultivation spread from China to Southeast Asia, Persia (the Middle East), Europe and Africa before coming to America.

WHERE IS U.S. RICE GROWN?

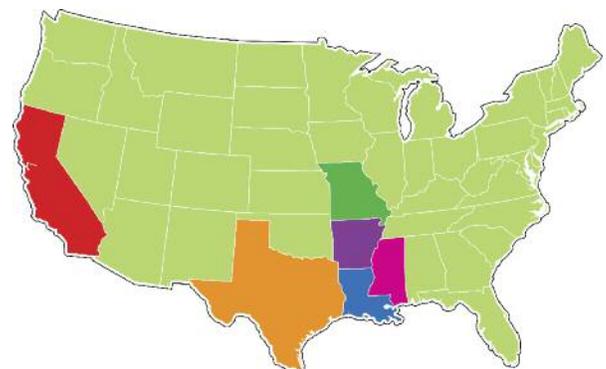
In the United States today, rice production is concentrated in six states: Arkansas, California, Louisiana, Mississippi, Missouri and Texas. The Mississippi delta, which includes areas of Arkansas, Louisiana, Mississippi and Missouri, is the largest rice-producing region, with Arkansas accounting for 45% of the total U.S. rice acreage. Southern states produce an abundance of long grain and some medium grain rice. California is the second largest rice-growing state, with medium and short grain rice along with a number of specialty varieties in the Sacramento Valley. U.S.-grown rice is renowned for high-quality rice products enjoyed in the U.S. and around the world.

U.S. Rice Production (2008 Crop)			
State	Area Harvested (1,000 acres)	Yields (lbs.)	Production (1,000 cwt.)**
Arkansas	1,395	6,660	92,900
California	517	8,320	43,000
Louisiana	464	5,830	27,000
Mississippi	229	6,850	15,700
Missouri	199	6,620	13,200
Texas	172	6,900	11,900
United States	2,976	6,846*	203,700

*U.S. average.

**“cwt” is the standard industry measurement for “hundred weight”, or 100 lbs.

Source: USDA, Crop Production 2008 Annual Summary, January 2009



The U.S. produces about 19 billion pounds of rice annually in six states.

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U.S.-GROWN RICE

- Research shows that chefs and foodservice operators prefer to buy U.S.-grown rice to support local farmers and the U.S. economy.
- The USA Rice Federation’s “Grown in the USA” logo identifies rice that is grown and packaged in the U.S. for domestic and worldwide markets.
- Over 80 percent of the rice consumed in the U.S. is grown here. U.S. rice farmers produce about 19 billion pounds of rice each year.
- The U.S. is the 4th largest rice exporter, sending 50 percent of annual production to overseas customers.
- Operations that choose U.S.-grown rice ensure that they are serving products grown and harvested by farmers according to the highest production and quality standards.



RICE PRODUCTION

Rice makes its journey from field to table over a two-step route: Cultivation and Milling.

Cultivation

Flooding

Rice is cultivated differently than other grains because it requires controlled flooding and draining of the land.

- Flooding early in the rice plant’s development provides moisture, reduces weeds and controls pests.
- Draining occurs at the proper point in the plant’s maturation to ensure that the grain dries in time for harvesting.

These conditions occur naturally in some tropical and subtropical areas where the rainfall patterns are ideal for rice cultivation. In many countries, such as the United States, flooding is done through irrigation for better control from planting through harvest.

Irrigation

- Growing rice through irrigation begins by flooding the land to a depth of two to three inches.
- Rice grains are scattered over the water or young rice plants are individually planted into the muddy water. Today, rice farmers in the United States use modern technology, and the seeds are often spread over fields using airplanes.
- It takes three to six months for the rice to reach maturity. Harvest time is signaled when the moisture content of the grain reaches 18 to 23%.

Rice Harvest

- When the rice is ready for harvesting the fields are drained and the rice grains are separated from the stalks.
- The harvested grain is dried. Traditionally this was done in the sun, but modern farms use forced air blowers to dry the rice to approximately 12 to 14% moisture content depending on the type of rice.
- Dried rice is called “paddy,” “rough” or “cargo” rice.

ORGANIC RICE

U.S. organically produced rice is available in all types including short, medium and long grain white and whole grain brown rice. Organic rice is farmed using environmentally sustainable practices regulated by the USDA’s standards for organic certification of foods.

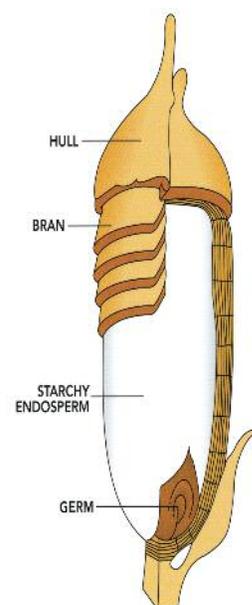
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Milling

Milling transforms the indigestible paddy rice into food consumable by humans.

Anatomy of a Rice Grain (Four Major Parts):

1. **Hull** – The fibrous indigestible shell of the rice kernel. The hull must be removed to make rice edible for humans.
2. **Bran** – The outer layer of the dehulled rice kernel. Rice bran ranges in color (due to the presence of naturally antioxidant-rich pigments) from pale tan to brown and from red to purple-black.
3. **Endosperm** – The large interior of the rice kernel, which includes most of the protein, starch, vitamins and minerals.
4. **Germ** – The embryo of the rice kernel, which would sprout into a new plant if allowed to germinate. The germ contains most of the oil in the rice kernel.



MILLING STEPS

(See Rice Processing Flow Chart in Additional Resources)

Rice can be milled to varying degrees.

1. The outside layer (the hull or husk) is inedible and is removed. All rice that is used for human food has the hull removed by machines called “shellers.”
2. The remaining grain is called “whole grain rice,” the most common type being “brown rice,” although black rice and red rice are also whole grain rices. It contains the endosperm, germ and bran. The color of the bran determines the actual color of the whole grain rice, such as brown, black or red. Any rice with bran and germ intact is 100 percent whole grain rice.
3. To turn whole grain brown rice into white rice, the grains are passed through machines that rub the grains together to remove the bran and germ.
4. Brown and white rice are both sorted to remove any broken rice kernels.
5. In the United States, most white rice is enriched by coating the surface with a thin layer of nutrients including thiamin, niacin, iron and folic acid. To preserve the nutrients in enriched rice, it is recommended that it should not be rinsed before or after cooking.

Types of Rice by Milling	Degree of Milling	Description
Paddy Rice	None	The whole rice grain after harvest before it is milled. It is indigestible by humans (paddy rice may be used for animal feed).
Whole Grain Rice (such as Brown Rice)	Hull (husk) removed with bran and germ intact	100% whole grain rice takes on the natural color of the bran; has a chewy texture and nutty flavor; contains vitamins, minerals, fiber, antioxidants and phytonutrients.
White Rice	Hull, bran and germ removed	A nutritious, complex carbohydrate and the predominant form of rice consumed around the world. It is white to off-white in color, has mild flavor and aroma.

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Visit www.MenuRice.com for more information on all of these topics.

REVIEW/QUIZ QUESTIONS

1. How much of the rice that is consumed in the U.S. is grown here?
2. Rice has been cultivated since _____.
a) The Civil War b) 20 Million BC c) 2000 BC
3. In the 1800s, the U.S. produced rice that was at that time considered some of the finest in the world. What was the name of this rice?
4. What is unique about the cultivation of rice as compared to other grains?
5. What is the most widely known and available type of whole grain rice?
6. The Mississippi delta produces more rice than any other area of the U.S. In which region of the U.S. is the Mississippi delta located?
a) West coast b) South-central c) New England
7. Which state has the most acreage devoted to rice?
a) Arkansas b) South Carolina c) California d) Texas
8. Name the four parts of the rice kernel.
9. What region in California produces an abundance of medium and short grain rice?
10. Name the nutrients used to enrich rice.



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REVIEW/QUIZ ANSWERS

1. Over 80%
2. C
3. Carolina Gold
4. It requires controlled flooding and draining of rice fields.
5. Brown rice
6. B
7. A
8. Hull or husk, bran, endosperm, germ.
9. Sacramento Valley
10. Thiamin, niacin, iron, folic acid.

