Rice

*Lesson Plan for Grade 6 , Social Studies*

*Prepared by NAITC*

*Modified by Mississippi State University, School of Human Sciences*

*for Mississippi Farm Bureau Federation - AITC*

# OVERVIEW & PURPOSE

Students will learn about the cultivation and parts of rice while also covering subjects including mathematics, economics, and geography. Activities include reading *One Grain of Rice* by Demi and removing the hull, bran, and germ from grains of rice.

# EDUCATION STANDARDS

**Mississippi College-and-Career Readiness Standards:**

G.6.2Explain the concept of place and the factors that give meaning to particular places.

**NALOs**

T3.6-8.g Identify agricultural products (foods) that provide valuable nutrients for a balanced diet

T5.6-8.g Identify agricultural products that are exported and imported

OBJECTIVES

* Students will be able to identify the major world rice producers.
* Students will be able to describe the process of turning rough rice into brown rice and turning brown rice into milled white rice.

# MATERIALS NEEDED

Interest Approach

* World wall map
* Sticky notes, 1 per student

Activity 1:

* *One Grain of Rice: A Mathematical Folktale* by Demi
* [More Than One Grain of Rice activity sheet](https://cdn.agclassroom.org/media/uploads/2016/09/21/One_grain_rice_activity_sheet.pdf), 1 per student
* Calculators

Activity 2:

* *Background Agricultural Connections* information from this lesson
* [Rice Paddy Images](https://cdn.agclassroom.org/media/uploads/2016/09/23/rice_paddy_images.pdf)

Activity 3:

* [Rice Examples](https://cdn.agclassroom.org/media/uploads/2016/09/23/Rice_examples_page_1.pdf) page
* Rice in the hull, 6 grains per pair of students
  + Rice in the hull is [available for purchase](https://agclassroomstore.com/rice-in-the-hull/) from agclassroomstore.com
* Mouse pad pieces, 2 per pair of students
  + Cut a regular-sized mouse pad into quarters or cut rubber-backed place mats to a similar size
* 2" x 2" pieces of 70-100 grit sandpaper, 2 per pair of students

Essential Files:

* [More Than One Grain of Rice Activity Sheet](https://cdn.agclassroom.org/media/uploads/2016/09/21/One_grain_rice_activity_sheet.pdf)
* [Rice Examples Page](https://cdn.agclassroom.org/media/uploads/2016/09/23/Rice_examples_page_1.pdf)
* [Rice Paddy Images](https://cdn.agclassroom.org/media/uploads/2016/09/23/rice_paddy_images.pdf)

# Lesson Set Up:

Interest Approach:

* Have a map of the world displayed for all students to see.
* Have sticky-notes (1 per student) available

Activity 1- One Grain of Rice:

* Purchase the book *One Grain of Rice* by Demi.
* Have a copy of the [More Than One Grain of Rice activity sheet](https://cdn.agclassroom.org/media/uploads/2016/09/21/One_grain_rice_activity_sheet.pdf) for each student.
* Have calculators available for students to double check their work.

Activity 2- Geography of Rice

* Have a copy of the *Background Agricultural Connections* section ready to read to the class.
* Share and discuss the [Rice Paddy Images](https://cdn.agclassroom.org/media/uploads/2016/09/23/rice_paddy_images.pdf) with students.
* Can also share and discuss the NOVA interactive presentation [Build a Rice Paddy](http://www.pbs.org/wgbh/nova/ancient/rice-paddy.html) with students.

Activity 3- Rice Processing:

* Rice in the hull, 6 grains per pair of students
* Mouse pad pieces, 2 per pair of students
  + Cut a regular-sized mouse pad into quarters or cut rubber-backed place mats to a similar size
* 2" x 2" pieces of 70-100 grit sandpaper, 2 per pair of students

# Vocabulary

**brown rice:** whole grain rice from which the inedible hull has been removed, but which still has the germ and outer layers of bran

**regions:** areas of Earth’s surface that have unifying physical and/or human characteristics

**rough rice:** unprocessed rice still in the hull as it comes from the field, also known as paddy rice

**staple food:** a food that is eaten regularly and is a dominant part of the diet, supplying a major proportion of energy and nutrient needs

**white rice:** rice from which the inedible hull, germ, and outer layers of bran have been removed

# Ag Facts:

* Rice farming is about 10,000 years old.
* Thousands of varieties of rice are farmed.
* Rice is the primary staple food for more than half of the people on Earth.
* *Toyota* means bountiful rice field. *Honda* means the main rice field.
* There were 221 rice farms in Mississippi in 2021.
* The production value of rice in 2021 was $92 million.
* Mississippi ranks #6 in the United States in rice production, producing 7.5 million hundredweight of rice.

# Background Information for Teacher:

Rice is the primary staple food for more than half of the people in the world, and it is grown on every continent except Antarctica. Most of the world’s rice is grown and eaten in Asia. China, India, and Indonesia are three of the top rice-producing countries in the world. Rice is also an important crop in Latin America and Africa, where Argentina, Brazil, Colombia, Madagascar, Nigeria, and Tanzania are important rice-producing countries.

There are four major regions of US rice production: the Arkansas Grand Prairie, the Mississippi Delta, the Gulf Coast, and the Sacramento Valley of California. Nearly all of the rice grown in the United States comes from six states: Arkansas, California, Louisiana, Mississippi, Missouri, and Texas. The United States produces less than 2% of the world’s rice but is a major exporter, contributing more than 10% of the rice that is globally traded. About half of all rice grown in this country is exported. The United States also imports some rice from other countries. Nonetheless, more than 80% of the rice used in the United States is grown by US farmers.

The United States has the world’s highest yielding rice farms due to the wide availability of irrigation and advanced technology. Rice fields are leveled using computerized, laser-guided land-leveling equipment to make sure the flooded field or “rice paddy” is perfectly flat. Seeds are planted in early spring to an exact depth by grain drills pulled behind a tractor or cast over dry or flooded fields by airplane. Fields are flooded between March and May, depending on the region. Flooded rice fields provide important wetland habitat for hundreds of species of birds, mammals, and amphibians. Recirculating irrigation systems have allowed farmers to maximize yields and reduce the amount of water required by over one-third in the last 30 years. Between September and November, the rice is mature and ready for harvest. The fields are drained, and then the rice is harvested using combines. The rice heads are removed, and the rice stem or straw is left. The straw is cut and baled later, just like wheat, barley, and oat straw. The rice, called rough rice at this point, is then transported to a dryer where moisture is slowly removed from each grain. Finally, the rough rice is sent to a mill for processing.

The rough rice is first milled using a rice huller to remove the chaff (the outer husks or hulls of the grain); this creates brown rice. This process may be continued, removing the germ and the brown outer layers, which are called bran, to create white rice. Rice, both brown and white, is grouped by size: long, medium, or short grain. Short grain rice tends to be sticky, while long grain rice remains separate and is light and fluffy after cooking. Rice is used in breakfast cereals, baby food, rice cakes, beverages, and as table rice.

It is believed that rice was first cultivated in ancient Asia and from there spread to Africa and Europe. Rice was later introduced to South and North America and Australia with the advent of sea voyage. Rice farming in California began in the early 1900s, mainly in response to the increasing Chinese population during the Gold Rush.

Rice is the world’s second or third largest crop, behind maize (corn) and sometimes wheat.Rice cultivation is well suited to countries and regions with low labor costs and high rainfall, as it is very labor-intensive to cultivate without expensive machinery and requires plenty of water. Rice is a nutritious, affordable source of carbohydrates and is packed with vitamins and minerals. It includes thiamin, riboflavin, niacin, phosphorus, iron, and potassium, and is an excellent source of amino acids. Only a trace amount of fat is found in either brown or white rice. Brown rice is a good source of fiber and is part of a solid foundation for a healthy diet.

# LEARNING PROCEDURES

Interest Approach:

1. Ask students if they would rather have $10,000 dollars right now or receive one penny today and double it every day for 30 days?
2. Ask them to explain their answers.
3. Tell them you think they may change their minds after they hear the story you are going to read about doubling in mathematics! (The doubling of the penny over a month will result in over 5 million dollars!)
4. Now for a geography question—ask students to name all the places in the world that grow rice. On a large wall map of the world, place a sticky-note on the countries where students have said rice grows.
5. Tell students that you will return to the map later, but now it's time for a story.

Activity 1:

1. Read *One Grain of Rice* by Demi.
2. Ask students to figure out how much total rice Rani received from the Raja using the [More Than One Grain of Rice activity sheet](https://cdn.agclassroom.org/media/uploads/2016/09/21/One_grain_rice_activity_sheet.pdf) grid but not using calculators.
3. Have the students check their calculations using calculators and complete the additional questions about the doubling of a penny and a dozen eggs.
4. Use the following discussion questions to assess students' comprehension of the story and explore related concepts in economics:
   1. In what food group does rice belong? *(Grain)*
   2. What good did the farmers in the story by Demi produce? *(Rice)*
   3. Is rice a scarce good? *(Yes! It is a tangible item that people produce using productive resources—natural, human, and capital. Thus, rice is not a free good. Like all scarce goods, it commands a price in the marketplace.)*
   4. Why did the rice farmers give almost all of their rice to the Raja? *(He commanded it. In return, he promised to store the grain.)*
   5. What happened when the famine occurred? *(The supply of rice decreased, and the people had almost nothing to eat. Rice, which is already a scarce good, became much more scarce!)*
   6. When a good becomes more scarce, what typically happens to the price? *(It increases.)*
   7. When the price of rice rises compared to other goods, what do producers of rice typically do? *(Produce more rice! In the near term, this will cover higher production costs and, hopefully, earn the producers more profit.)*
   8. When the price of a good rises compared to other goods, what do consumers of rice typically do? *(Consume/purchase less rice!)*

Activity 2:

1. Looking at the world map and the sticky notes where students guessed rice is grown, read the first two paragraphs in the *Background Agricultural Connections* section aloud to the class.
2. Add sticky notes to the wall map where needed (note that rice is grown in many countries and only the most prominent are mentioned here). Ask students to color in these areas on the map on their *More Than One Grain of Rice* activity sheets, including the top six states in the United States. Also ask students to answer the last question on the activity sheet.
3. Ask students if they can think of anything these rice-growing regions have in common. *(They have wet, warm climates; they are found at middle latitudes that are not too far north or too far south.)*
4. Explain to students that rice needs a long, warm growing season and lots of water. Rice can even grow in standing water, so rice farmers often flood their fields. Flooding rice fields ensures that the rice has plenty of water and prevents most weeds from growing. The flooded fields are drained and allowed to dry when it is time to harvest the rice.
5. Share and discuss the [Rice Paddy Images](https://cdn.agclassroom.org/media/uploads/2016/09/23/rice_paddy_images.pdf) with students. In order to flood rice paddies, they must be enclosed around the edges to hold water. In hilly areas rice fields are terraced, creating level areas that can hold water. Discuss the difference between harvesting with a tractor and harvesting by hand. You may also wish to share the NOVA interactive presentation [Build a Rice Paddy](http://www.pbs.org/wgbh/nova/ancient/rice-paddy.html)*,* which illustrates how land is terraced for rice cultivation.
6. Use the following discussion questions to further explore the geography of rice:
   1. How long have people been growing rice? *(Approximately 10,000 years)*
   2. Where do you think rice was first cultivated? *(Scientists have found evidence of ancient rice cultivation in several different locations in Asia. It's likely that rice farming was developed simultaneously by different ancient civilizations in Asia.)*
   3. What do you think rice farming was like thousands of years ago? *(Although tractors are a recent invention, people have been modifying the movement of water and the shape of the land to grow rice for thousands of years. Without engines, people used the power of flowing water, human labor, and animal strength to move materials, plow fields, and weed and harvest crops.)*
   4. Do you think rice was as important to ancient civilizations as it is to people today? *(Rice was a foundational crop for ancient civilizations in India and China. The development of civilization went hand-in-hand with the development of agriculture.)*
   5. What geographic features might be important to a civilization that depends on growing its own rice as a staple food? *(There are many. For example: latitude and altitude (both affect the length of the growing season), the quality of the soil for fertility and for holding water (clay soils hold water, while sandy soils allow water to drain quickly), the presence of rivers to provide irrigation water, etc.)*

Activity 3:

In order for harvested rice to be edible, the hulls must be removed. White rice is obtained by milling further to remove the rice bran and germ (see [Rice Examples page](https://cdn.agclassroom.org/media/uploads/2016/09/23/Rice_examples_page_1.pdf)). White rice cooks more quickly and has a better shelf life than brown rice, but the nutritional value is reduced by removing the germ and bran.

Turning rough rice into brown rice (students should work in pairs):

1. Ask students to place six rough rice kernels between two mouse pads and then remove the hulls by using a back and forth motion on the top pad.
2. Students should continue to rub the two pieces of pad back and forth until all of the hulls are removed from the rice kernels. Rice hulls are often burned in biomass plants to produce energy or incorporated into animal feed.
3. Once the hull is removed, students are looking at brown rice (which can be packaged and sold). But most of the rice they are familiar with is white, so...

Turning brown rice into milled white rice:

1. Place the six hulless kernels of brown rice on a piece of sandpaper and lay a second piece of sandpaper on top.
2. The students will need to rub the two sheets of sandpaper together for about 3-5 minutes or until they see the familiar white rice.
3. When finished, the students will be able to observe two distinct rice products—milled white rice and rice bran. Eating brown rice, which includes the bran, helps people get their necessary dietary fiber and more nutrients. Most of the rice bran removed in the milling process for white rice is used in animal feed. After this milling experience your students will probably never look at a grain of rice the same again!

**Concept Elaboration and Evaluation**

After conducting these activities, review and summarize the following key concepts:

* Rice is an important crop grown by farmers around the world. After harvest, the rice must be processed at a mill.
* Brown rice is milled to remove the hull, and then it is ready to package and sell to consumers. White rice is processed more in order to remove the germ and bran.
* Rice is a staple food for more than half of the people in the world.
* Geographic features that affect the availability of water and the length of the growing season help determine where rice is grown.
* Rice has been cultivated for thousands of years. Today we have advanced technology that helps achieve high rice yields, but in some parts of the world rice is still cultivated using only human and animal power.

Additional Learning Procedures

To help students review and elaborate more about rice, try using the [“I used to think…Now I think…”](https://drive.google.com/file/d/1Wc8uaL7Sgv-41SbhihCTNiRnf6-utkrV/view?usp=drive_link) method to allow students to think deeper and make new connections.

Additional Things to Consider:

[Beatrice’s Goat](https://agclassroom.org/matrix/resource/413/)

[Everybody Cooks Rice](https://agclassroom.org/matrix/resource/241/)

[Ice Cream:The Full Scoop](https://agclassroom.org/matrix/resource/1223/)



Source: <https://www.agclassroom.org/teacher/matrix/>

*For more information and additional lessons visit*

*https://msfb.org/ag-in-the-classroom/lesson-plans/.*