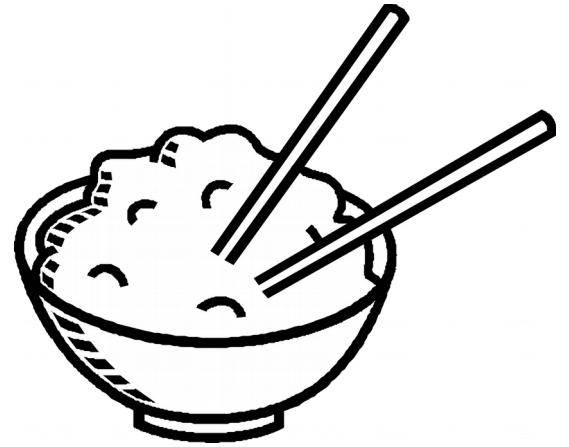


Rice Paddy in a Bucket

*A lesson from the New Jersey Agricultural Society
Learning Through Gardening Program*

OVERVIEW: Rice is one of the world's most important food crops - more than half the people in the world depend on rice for their daily meals. In many Asian countries, where rice is a staple for 95% of the people, rice is still planted and harvested by hand. In this lesson, students will learn about this staple food and how it is grown in flooded fields. For grades PreK-2, the lesson can be paired with a study of the Maurice Sendak poem, Chicken Soup With Rice, with many accompanying math or language arts activities. For grades 3-5, the lesson can be paired with a math lesson on doubling, illustrated in Demi's book One Grain of Rice.



GRADES: PreK-5

The lesson can be paired with different activities for grades PreK-2 and 3-5.

OBJECTIVES: The student will be able to:

Explain what a staple food is and name some of the foods that people in the world eat every day.

Describe where and how rice is grown.

MATERIALS:

The Learning Through Gardening power point presentation:

Growing Rice, A Food That Feeds the World

Bucket

Potting or garden soil

Water

Rice seeds

Newspaper

MATERIALS continued:

Optional:

For grades PreK-2, the book, Chicken Soup With Rice, A Book of Months by Maurice Sendak

For grades 3-5, the book One Grain of Rice, a Mathematical Folktale, by Demi.

PROCEDURE:

Ask students if there are any foods they eat every day. Make a list on the board. Ask students if there are any foods they eat several times a week. Tell students the food people depend upon for their daily meals is called a staple food. Ask students what their staple foods are. Ask what they think some staple foods in different parts of the world are. Tell students that today you are going to discuss rice, which is a staple food for more than half the people in the world. Show the power point presentation. "*Growing Rice, A Food That Feeds the World.*" The power point presentation can be downloaded from the New Jersey Agricultural Society website's Teacher Toolbox: www.njagsociety.org.



How to Grow Rice

Next, tell students that you are going to plant some rice seeds to grow in the classroom. Ask them what they remember from the power point presentation about how rice is grown.

Soak your rice seeds for 12 hours in a bowl of water.

Use a permanent marker to mark six inches from the bottom of a clean bucket. Fill the bucket with 6 inches of potting or garden soil. Add water to the soil until it is just saturated. Do not allow water to stand on the soil's surface.

Sprinkle rice seeds on top of the soil in the bucket. Sprinkle and smooth a 1/4-inch layer of dry soil over the seeds on the surface. Lightly water this layer of soil.

Place the bucket in an area that receives full sun throughout the day. If you are growing rice indoors in winter, be careful to keep the bucket in a warm place. Rice grows best in soil and air temperatures around 75 degrees Fahrenheit.

Add water as needed to keep the soil saturated while the seeds germinate. In about 7-10 days you should see small green shoots emerging.

When the rice plants are 7-9 inches tall, add water so that there is $\frac{1}{2}$ -inch of floodwater covering the soil. Increase the flood depth by $\frac{1}{2}$ -inch per week until a depth of about 2 inches is reached. You can use a permanent marker to mark the four $\frac{1}{2}$ -inch increments.

Wait for the rice grains to mature. In about four months, the rice plants will grow to a height of about three feet. Do not let the soil dry out. If the water level drops, add water to keep the level at 2 inches.

When the rice seeds begin to appear, stop adding water and allow the water to evaporate slowly during the final growth period. Continue to let the rice ripen until the heads of the plant droop and the stalks change color from green to gold, which usually takes about two weeks. The rice plant should be dry when it is harvested.

Harvest the rice by cutting the stalk directly beneath the heads. Wrap the stalks and heads in newspaper and dry them in a sunny area for two to three weeks.

Roast the rice heads in an oven set to 180 to 200 degrees Fahrenheit for approximately one hour. Allow the rice to cool completely before gently rubbing the heads to release the rice kernels. Rinse the kernels. Now you are ready to cook your own home-grown brown rice.

Students can keep a record of their rice plants' growth in their science journals and/or graph the growth of different plants on a chart.

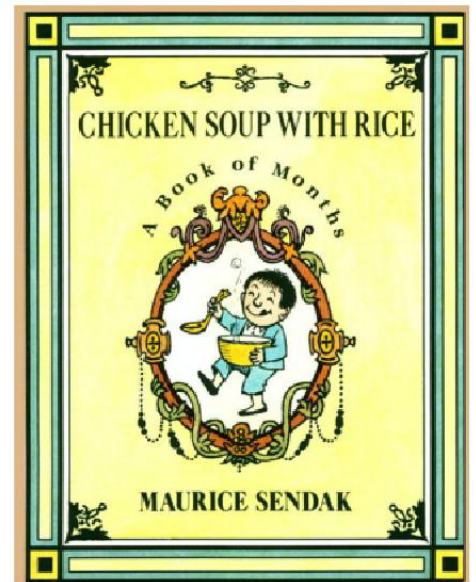
EVALUATION:

Depending on grade level, students can draw or write a sequence or paragraph describing how rice grows. Students can draw a picture or write a paragraph showing what they believe is their staple food and why.

EXTENTIONS: PreK-2:

In January it will be
Time to plant a rice paddy.
The change from seed to grain we'll see.
Growing once, growing twice,
Growing chicken soup with rice

Link the lesson of growing rice and rice as a staple food to the reading of Maurice Sendak's popular book Chicken Soup With Rice, A Book of Months. Depending on the grade level, activities can include:



CALENDAR MATH

Younger students recite and discuss the months of the year. What is the weather like in each month? What usually happens in each month? Use a class calendar to track students' birthdays or special events. Ask questions such as: how many months until Sam's birthday? Count together.

Older students can extend calendar learning by figuring the number of weeks and the number of days in a month. Ask students to figure how many weeks and how many days until their birthday, a school holiday, or summer recess. Use the calendar to discuss seasons. Have students to color in the four seasons on a calendar. What changes do we see in each season? Ask students to make a timeline of the year or of their lives, asking parents to supply dates of important events.

LANGUAGE ARTS

Poetry: Discuss rhyming words in the monthly poems. Make a list of those words and other words the author could have used to rhyme. Discuss the rhythm or beats of the poem. Ask students to clap the beats of different lines. Discuss which lines are always the same and which are different.

Phonics: Discuss short and long vowels and make a list of words in the poem that are an example of both.

Theme: Divide students into small groups and assign each group a different month from the poem. Ask students to discuss: what other things do you do in that month? Challenge the group to rewrite that month and share with the class.

SCIENCE:

Discuss seasonal weather changes. How are they reflected in the poem?

Social Studies:

Locate Spain, Bombay, and the Nile on the map. What are they? What is it like in those locations? Discuss the map of places where rice is grown. What do these places have in common?

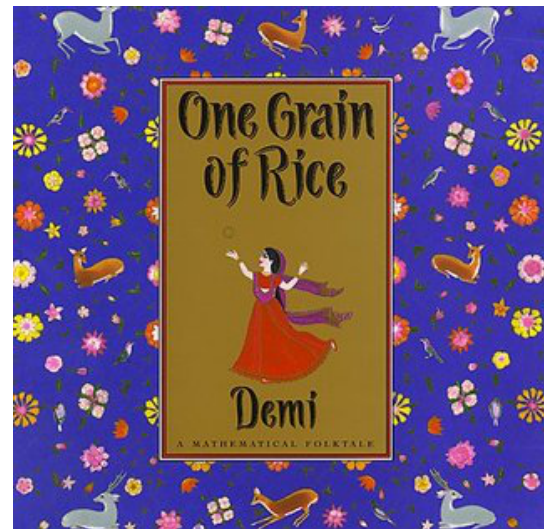
EXTENSIONS: 3-5:

MATH: Ask students which sum of money they would rather have:

\$100,000 in their hands right this minute or
They can receive one penny today. Then that amount would be doubled every day for a month (30 days).

Ask them to explain their answers. Tell them you think they may change their minds after they hear the story you are going to read about doubling in mathematics!

Read One Grain of Rice, A Mathematical Folktale, by Demi. Ask students if they were surprised by the amount of rice Rami received for the hungry people. Ask students to figure out how much money they would have if they chose the option to receive one penny today, and then double that amount every day for 30 days. Use the worksheet provided at the end of this lesson. Students can work individually, or in pairs or small groups. Have the students check their calculations for each day using calculators and then figure out the total amount of money they would receive.



SOCIAL STUDIES: Display a large map of the world. Ask students to find places in the world where rice is grown and place a sticky-note on those countries.

Ask students to discuss in small groups what are the staple foods they eat. Then ask them to list what they think are the most important staple foods in the world. Have them research and share their answers.

SCIENCE: Discuss how a plant that is pollinated by the wind is different than a plant that is pollinated by bees and other pollinators. What parts are the same? What parts are different? Have them research their answers. In small groups, ask students to discuss what is the more efficient method of pollination and why. Discuss their answers.

Background Information:

Animal pollination is more effective than wind pollination because it is more precise.

Explanation:

Plants that rely on wind for pollination are dependent on weather conditions. If there is no wind, there is no pollination. Pollination due to wind is less precise since the pollen grains will land wherever the wind takes them. Pollen also generally doesn't travel as far by wind.

Animal pollination is more precise and the chance of cross pollination is less since the animals mostly visit the same kind of flower. Many of the pollinator-pollen pairs have co-evolved together, meaning the plant has adapted to attract the pollinator and the pollinator has adapted to better locate or utilize the plant. This also increases the reliability and efficiency of pollination, because the pollinator can be expected to return to the plant if it benefits in some way, by receiving food or protection.

The differences between plants pollinated by wind versus by insects are shown below:

Wind-pollinated Plants	Insect-pollinated Plants
They are small.	They are large or grouped to form large clusters.
Dull colors	Bright colors to attract insects
Odorless with no nectar	Strongly scented and filled with nectar or edible pollen
Pollen is produced in large numbers	Fewer grains of pollen are produced
Examples: rice, wheat, grain	Examples: tomatoes, pumpkins, lettuce

NAME _____

The Magic of Doubling – Do the Math

You have two choices:

- 1) You can receive \$100,000 today, OR
- 2) you can receive one penny today. Then that amount would be doubled every day for a month (30 days).

Which do you choose? _____

Fill in the chart to see how much money you receive in Option #2

Day 1	Day 2	Day 3	Day 4	Day 5
Day 6	Day 7	Day 8	Day 9	Day 10
Day 11	Day 12	Day 13	Day 14	Day 15
Day 16	Day 17	Day 18	Day 19	Day 20
Day 21	Day 22	Day 23	Day 24	Day 25
Day 26	Day 27	Day 28	Day 29	Day 30

Doubling – Do the Math Answer Sheet

Answer Sheet

You are offered two choices:
you can receive \$100,000 today

OR you can receive one penny today. Then that amount would be doubled every day for a month (30 days).

Day 1	Day 2	Day 3	Day 4	Day 5
	2	4	8	16
Day 6	Day 7	Day 8	Day 9	Day 10
32	64	128	256	512
Day 11	Day 12	Day 13	Day 14	Day 15
1,024	2,048	4,096	8,192	16,384
Day 16	Day 17	Day 18	Day 19	Day 20
32,768	65,536	131,072	262,144	524,288
Day 21	Day 22	Day 23	Day 24	Day 25
1,048,576	2,097,152	4,194,304	8,388,608	16,777,216
Day 26	Day 27	Day 28	Day 29	Day 30
33,554,432	67,108,864	134,217,728	268,435,456	536,870,012

Add all these numbers together to get the total amount received: \$1,073,741,823