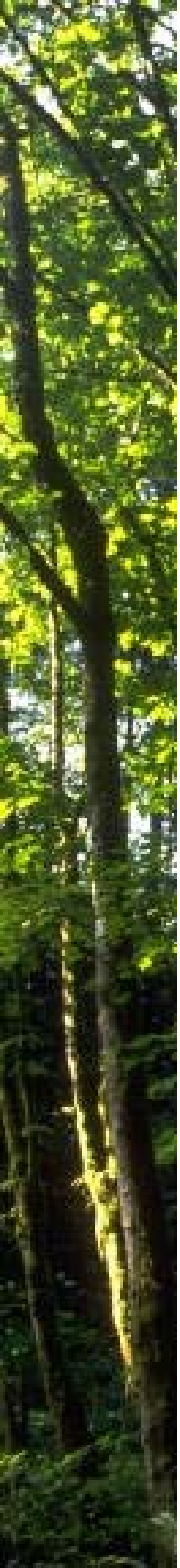

Rain Forest Teaching Curriculum

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Welcome to Rain Bird's Rain Forest Teaching Curriculum!

The Rain Bird Rain Forest Teaching Curriculum features "I can relate to that" science learning tools for teachers, students, and parents. The following is a list of answers to some frequently asked questions about the Rain Bird Rain Forest Teaching Curriculum:

What is it?

Rain Bird's Rain Forest Teaching Curriculum is an online educational tool for teachers to use and find specific lesson plans and related course work for kindergarteners through high school seniors. This content is also available online at www.rainbird.com.

What is its purpose?

To teach natural history, ecology, biology, physics, and chemistry through demonstrations, experiments, and classroom activities. Rain Bird and California State Polytechnic University, Pomona (Cal Poly Pomona) designed the program content, which focuses on endangered tropical rain forests in Latin America, South America, Africa, and Southeast Asia as the basis for teaching science through fun, hands-on things children already do and like—art projects, outdoor activities, and classroom demonstrations. The curriculum motivates kids to think about the part each of them plays—or the actions they can take—in preserving and protecting the environment.

Who should use it?

Teachers and parents. Teachers who are seeking a new, fun and engaging resource to teach children about science. Parents who are looking for friendly, but educational how-to's on "bringing science home." But most of all, it offers something for just about anyone and it's just plain fun for kids, no matter what their age.

Is the information easy to use?

Yes! The information is well organized and self-explanatory. The curriculum is arranged with grade-appropriate material (K-1, 1-2, 2-3, 3-4, 4-5, 6, 7, 8, and 9-12). As appropriate, each grade level contains projects that integrate science with art; data gathering, observation, and inference; analysis of physical matter; in-class demonstrations to be performed by teachers for students; and at-home projects that illustrate scientific principles in a manner both understandable and meaningful to school-age children.

Why the focus on rain forests?

Rain Bird has always supported and educated its consumers on the importance of the "Intelligent Use of Water." The curriculum ties into this philosophy because rain forests provide oxygen and consume carbon dioxide, playing a pivotal role in the climate control of our planet. This affects wind, rainfall, humidity, and temperature worldwide. Rain Bird is deeply concerned about the environment and has always promoted stewardship of Earth's resources, or which water is among the most precious. Some 30 million species of plants and animals—a majority of all things living on Earth—exist interdependently in tropical rain forests. In addition, rain forests are rich with plants vital in creating modern medicines.

What has the response to the curriculum been?

Thousands of online visitors each month learn about the important role tropical rain forests play in the world. And, because the information is being so well received, Rain Bird has expanded its commitment to university-level education through its partnership with California State Polytechnic University, Pomona. Jointly, they will unveil in 2002 three Rain Bird Learning Centers at Cal Poly Pomona's BioTrek Project, located on the Cal Poly campus.

About Rain Bird

Rain Bird Corporation, based in Glendora, California, USA, is the world's largest manufacturer of sprinkler and drip irrigation equipment. Founded in 1933, Rain Bird offers the industry's broadest range of irrigation products to golf courses, sports arenas, amusement parks, farms, and commercial and residential developers in more than 130 countries. For more information, visit Rain Bird's web site at www.rainbird.com.

This workbook is brought to you through a partnership between:

Rain Bird, Azusa, California

Science IMPACT, College of Science,
California State Polytechnic University, Pomona

The Rain Forest: An Introduction

What is a tropical rain forest?

A tropical rain forest is a forest that receives 4 to 8 meters of rain each year.

Where are tropical rain forests located?

Rain forests are located within a narrow region near the equator in Africa, South and Central America, and Asia.

Why are tropical rain forests important to our earth?

Rain forests play an important role in the climate control of our planet by having an affect on the wind, rainfall, humidity, and temperature. Within the rain forest, water, oxygen, and carbon are recycled. This natural recycling helps to reduce flooding, soil erosion, and air pollution.

The rain forests support over one half of the plant and animal life on Earth, even though they cover only 2% of the Earth's surface.

Approximately one fourth of the pharmaceuticals (medicines) we use come from plants of the tropical rain forests. According to the National Cancer Institute, 70% of the plants from which we make medicines and that are effective in the treatment of cancer can only be found in the rain forests.

What is happening to our rain forests?

27 million acres of the Earth's rain forests are destroyed each year due to man. The activities which threaten the rain forests are: agriculture, clearing and developing of land, beef cattle ranching, logging, and the building of dams and hydroelectric plants. This results in a loss of 100 acres of rain forest per minute and 80% of the rain forests in the world are now gone. The destruction of the world's rain forests at this rate causes 10,000 plant and animal species to become extinct each year.

Grades K-5 Activities Overview

Curriculum materials are divided into grade level segments. Within the segments for grades K-5, there are four components of curriculum materials:

- **Science Through Art** – These activities integrate science and artistic skills, such as coloring, drawing, painting, and printmaking.
- **Interactive Science Activity** – These activities are experimental in nature, requiring students to take data, make observations of the data and, at higher grade levels, to make inferences from the data.
- **Outdoor Activity** – These activities allow students to gather materials from the field and perform scientific analyses, appropriate to their grade level, on the materials that they bring in from their excursion to the outdoors.
- **In-Class Demonstration** – These activities are demonstrations to be performed for the students by the teacher, using commonly available materials, and primarily related to physical science aspects of rain forest phenomena.

Grades 1-2 Activities At a Glance

- Science Through Art: Leaf and Flower Prints
- Interactive Science Activity: Environmental Conditions and Germination of Radish Seedlings
- Outdoor Activity: Attracting Hummingbirds
- In-Class Demonstration: Light Absorption

Grades 1-2 Science Through Art Activity: Leaf and Flower Prints

In this activity, making leaf and flower prints as an art project will give the students an opportunity to carefully observe leaves and flowers.

Materials:

White or light colored construction paper sheets (any size), poster paint, a variety of leaves and flowers.

Procedure:

Caution should be taken to keep hands as free of paint as possible to avoid smearing the paint and to create sharp images of the plant material.

1. Using poster paint and paint brushes, paint the underside of leaves (this is where the veins are the most pronounced) and then press the painted leaves, one at a time, on the paper, being careful not to smear the paint.

2. Repeat the process with flowers. When painting and pressing the flowers, the open blossom can be painted and then pressed onto the paper, or a closed blossom can be painted and pressed, giving a "side view" of the flower.

3. Allow the prints to dry thoroughly. If the prints are made on 11" by 17" paper and then plastic laminated, they make very attractive table place mats.

Grades 1-2 Interactive Science Activity: Environmental Conditions and Germination of Radish Seedlings

This activity allows students to learn a very simple method for seed germination that can be applied to many variations of this experiment. We will describe the analysis of the effect of nutrients on plant growth here. The same method can be applied to experiments that determine the effects of light, temperature, pH (acid/base conditions), and toxins on plant growth.

As mentioned, the students will explore the importance of nutrients on plant growth. In the rain forest, the soil is actually very nutrient poor because of the large amount of rainfall. The rain water causes the soil nutrients to continually go into solution and move away from the roots of plants. One may wonder then, how it is that the rain forests can be so lush and green when the soil contains so few nutrients?

The answer is decomposition. As plants and animals die and decompose, they release nutrients that are stored in the roots, stems, branches, leaves, flowers, and fruits of plants. Therefore, nutrients are very effectively recycled in the rain forest as plants and animals die and release nutrients during decomposition. The nutrients are then once again absorbed and stored in plant structures.

Materials:

Radish seeds (a couple of packages will be enough for the entire class), water, paper toweling or notebook paper, plastic beverage cups, aluminum foil, liquid fertilizer (plant food purchased from the grocery or home supply store).

Procedure: This activity works well for students working in pairs.

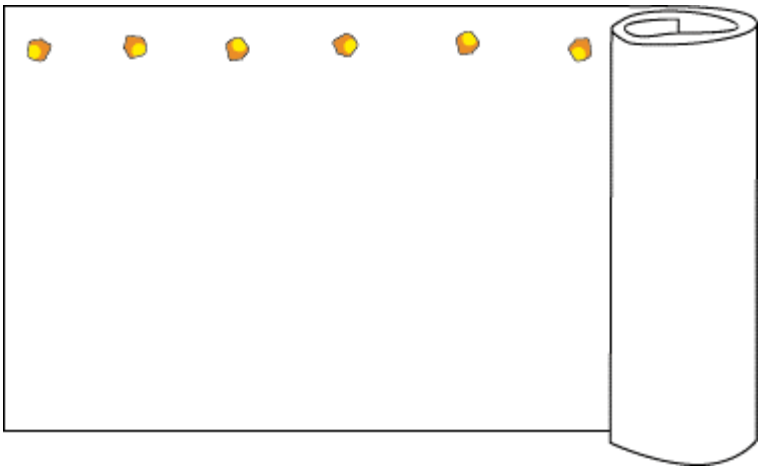
1. Soak the radish seeds in water for about an hour.

2. Fold a paper towel or piece of notebook paper lengthwise and float it in a shallow pan of water. Remove it and gently wring out the excess water (each pair of students needs to do this with two pieces of paper).

3. Give each pair of students twelve soaked radish seeds.

4. Lay six of the soaked seeds along the folded edge of the moist paper towel or piece of notebook paper. Roll the paper with the seeds into a cylinder, as in the diagram.

5. Repeat with the other six seeds on the second piece of paper.



6. Place the rolled paper cylinders in separate plastic beverage cups and add water to each cup to a depth of 2-3 cm.

7. Label one of the cups as a control and label the other as the experimental cup.

8. Provide nutrients to the experimental cup by adding a couple of drops of liquid fertilizer to the water.

9. Place a piece of aluminum foil loosely over both cups and allow the cups to remain undisturbed until the seeds germinate.

10. Once the seeds have germinated, remove the foil and place the cups in a location that provides them with light.

11. Have students measure the roots and the shoots of the growing plants and chart the growth of their seedlings every day or two.

12. Have students describe the effect of additional nutrients on the growth of the seedlings.

Questions for Students:

1. Why did you need two cups to perform this experiment? What conclusion could you draw if you had performed the experiment with only one cup?

2. What effect did the fertilizer have on the plant growth?

3. If you put in twice as much fertilizer, what effect would this have on the plant growth? How could you find out?

4. How does this experiment relate to human nutrition?

As mentioned in the introduction, this experimental procedure can be used to test the effects of any difference on plant growth. For effects of acidity, add a couple of tablespoons of vinegar to the water. For effects of alkalinity, add a couple of pinches of baking soda to the water.

Grades 1-2 Outdoor Activity: Attracting Hummingbirds

Many species of hummingbirds inhabit the rain forests of the world. Hummingbirds also inhabit other climate zones in the United States. Hummingbirds are attracted to red colored flowers, and flowers are a source of nectar for the birds to eat. When purchasing commercial hummingbird food and feeders, one notices that both the food and the feeders are red. In this experiment, we will determine if this red color is important in attracting the hummingbirds.

Materials:

Three hummingbird feeders, commercially prepared liquid hummingbird food (to ensure that it is proper food for the hummingbirds, as opposed to making your own solution), blue and yellow construction paper, blue and yellow paint

Procedure:

1. Paste blue construction paper over the bottle of one feeder, and yellow construction paper over the bottle of another. Leave the third bottle uncovered.
2. Paint the tips of the feeder tubes the same color as the construction paper.
3. Hang the feeders outdoors where they can be easily watched.
4. Observe the behavior of hummingbirds and note if they prefer the red feeder.
5. Once the feeders have been hanging for a week or more, check to see how much nectar was consumed by the hummingbirds from each of the feeders

Questions for Students:

1. Was there a difference in the amount of food consumed in the different feeders?
2. Why is commercial hummingbird food colored red?

Grades 1-2 In-Class Demonstration: Light Absorption

Rain forests are located close to the equator, where there is much sunshine, and the temperature is high. In this demonstration, the effect of the color of an object on the absorption of light is investigated.

Materials:

Black and white socks, socks of varying colors, thermometers.

Procedure:

1. Label the thermometers with a number so that you can identify each one.

2. After the thermometers have been placed on a table in the classroom for several minutes, record the temperature on each thermometer, along with the thermometer number.

3. Place one thermometer in each of the socks of different colors. Carry the socks outside, and place them in a location where each sock will receive the same amount of sunshine.

4. After ten minutes, record the temperature on each thermometer, along with the thermometer number.

Questions for Students:

1. Before you record the final temperatures, which sock would you predict to have the highest temperature difference?

2. Which sock had the highest temperature difference? Which sock had the lowest temperature difference?

3. Can you rank the colors of the socks in order of increasing temperature difference?

4. Can you explain the ordering in Question 3?