BIOME IN A BAGGIE

Background Information

The word biome is a scientific term used to describe a large community of plants and animals living together under the same environmental conditions. Some of the major biomes are the arctic tundra, desert, grassland, and rainforest. As the names of some of these biomes imply, each is typically defined by one or more of the main plant types that grow there. The plant types are determined by the environmental conditions found in the biome – primarily climate (average yearly temperature and precipitation). Of course the climate of a region is determined largely by its geographic location.

Creating a model biome is a great way to better understand the importance of an area's environmental conditions, especially water and light availability, in determining the types of plants and animals that can exist there. The model also demonstrates how water cycles through the environment by the processes of evaporation, condensation, and precipitation.

Productivity in real-world biomes mirrors the trends shown in the models. Generally speaking, areas that receive high levels of precipitation are more productive than drier areas. Also, areas that receive more sunlight (which increases levels of photosynthesis), and are consequently warmer, are more productive than darker, cooler areas. (Nutrient levels, too, play a role in productivity, but vary more and are more difficult to predict than the other two factors.)

Around the globe, plants and animals have taken on evolutionary strategies that are particular to their biome's conditions, whether they be intense heat and solar radiation, little direct sunlight, or frequent flooding. Few biomes have an abundance of all three necessary resources – water, light, and nutrients. At least one is nearly always in short supply. So plants and animals have adapted over generations to survive in spite of the shortages. No where is this clearer than in the desert.

Although there is more than enough sunshine in the desert to sustain high levels of photosynthesis in any plant that can grow there, water is quite limited. For example, the Sonoran Desert in Arizona receives no more than about 15 days of rain per year – not nearly enough for most plants. Over thousands of generations and millions of years, however, cacti and certain other types of plants have adapted to this harsh environment. They have evolved swollen, fleshy stems for storing water; spines that provide protection from thirsty animals; a waxy coating that makes their surfaces less porous; and stomata, the pores through which they take in carbon dioxide and release oxygen and water vapor, that stay tightly closed during the heat of the day. All of these adaptations enable cacti to conserve water, the desert's most precious commodity.

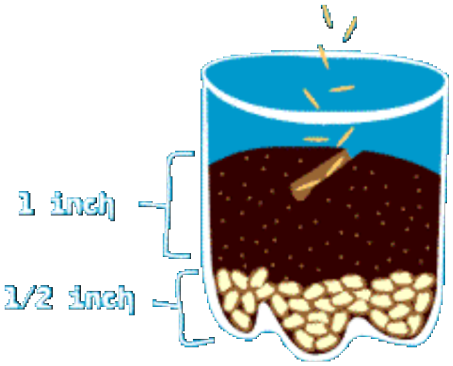
A biome is an ecological community, like a rainforest, desert, or prairie. It's a tiny environment. Here's a way to experiment with how plants grow in different environments. It's a biome in a baggie.

Materials Needed

- 2 liter soda bottle, cut in half
- Large re-sealable storage bag (Zip-lock)
- Pebbles
- Potting soil
- Seeds – grass, beans, or whatever you have available
- Water

Instructions

1. First, pour pebbles into the bottom half of the soda bottle. The pebbles should be about a half an inch deep.
2. Pour some potting soil over the pebbles. Your biome should have about twice as much soil as pebbles.
3. Now, to plant the seeds. Make a trench down the centre of the soil that is as deep as your fingernails.
4. Sprinkle a pinch of seeds in the trench.
5. Cover it with the soil.
6. Water the soil just until you see the water collect at the bottom of the pebbles



7. Put the biome in a plastic bag and seal it.
8. This creates an environment for your plants. The seeds will not need water again because the water will recycle itself. The roots of the plant absorb the water and the water travels up the stem to all the parts of the plant. When the water gets to the leaves, some of it evaporates. Some water also evaporates from the soil. The evaporated water forms drops on the bag. This is called condensation. The condensation then falls back down to the ground, like rain. This is called precipitation. This is the water cycle – evaporation, condensation, and precipitation.
9. Put the biome in a sunny place and in about three to four days plants should start growing. The best thing about a biome in a baggie is that everything your plants need is there. It has water, nutrients from the soil, air from the bag, and it makes food from the sun.

Variation

Experiment with the biome in a baggie. Make a few different biomes and change the amount of light and water they get. This way you can see how your plants grow in different environments. A rainforest is a hot, wet climate but does not have a lot of light. A desert is hot and dry and does not have much water. A prairie has medium amounts of light and water. Eventually your plants are going to run out of carbon dioxide. Do some research and find out what you would need to keep your biome in a baggie going for a long time.