



3-5 Life Science
3-5 Nature and History
3-5 Earth Science

Southern Nevada Regional Professional Development Program

Mojave Desert Unit-Plants

INTRODUCTION

According to the Clark County website in 2006 -1,912,654 people lived in Clark County. As desert dwellers, it is important for our students to develop an understanding and appreciation of the environment in which they live. Learning about our environment is a crucial part of our daily lives. We depend on all organisms, including plants, to survive from day to day.

WHERE'S THE SCIENCE?

The Mojave Desert is filled with a variety of **plant communities**, an area with a predictable associated group of plants. These communities differ based on elevation, soil type, amount of precipitation, and other major features of the habitat such as springs, washes, dunes or cliffs. Some plants can only live in very specific areas of the Mojave Desert, like the desert primrose which only grows on sandy dunes or the joshua tree which is found nowhere else in the world besides higher elevation areas of the Mojave. In addition, the Mojave Desert has about 200 common plants that are found in neither of the adjacent deserts, the Sonoran or Great Basin.

Mojave Desert plants have adaptations that allow them to survive in a harsh climate. Some have shallow root systems that spread out close to the surface enabling them to absorb as much rainfall as possible. Others,

like the mesquite tree, have root systems that search for water deep in the ground, while others have thorns that protect them from hungry animals.

MATERIALS

- Clear plastic cups (9oz.)
- Sandwich bags
- 1 roll of paper towels
- One bag potting soil
- One bag of perlite
- Safety goggles
- Paper plates
- Small paper bowls
- Plastic spoons
- Small bag of sand (may be collected from outside)
- Small plastic bottles or vials
- Small foil cake tins
- Hand lenses
- Mesquite seedpods and seeds
- Science Notebook (1 per student)

PROCEDURES

Lesson One: Desert Seeds

Before beginning this unit, collect seeds and/or seedpods from desert plants in your area and store in plastic bags. Be sure to check your district's safety manual to double check if plants are poisonous or not. Label the bags with the name of the plant. Also, take a digital picture of the plants to use later. If your school site has several desert plants, allow students to collect the seedpods. If you don't have access to desert seeds, skip this lesson.

1. Pass out various desert seedpods and/or seeds to the students. Ask them to observe the seeds and discuss observations with their group members. Pass out science notebooks and tell the students to record their observations in their science notebooks. They will need to set up a new section in their notebook labeled “Desert Plants” (see Desert Unit - Climate and Weather for further instructions). They should include a sketch of each of the seeds as well as observation notes.
2. Once the students are finished recording their observations, gather them together for discussion of their observations.
3. Tell the students that they will attempt to germinate each of the various seeds using a moist paper towel and a clear plastic baggie. Model for the class how to set up the baggies. Allow students time to do so.
4. The students should label the baggies for identification purposes later. When complete, they should add sketches and notes to their science notebook.
5. Observe the seeds over the next few weeks recording observations, changes and sketches. Discuss what the students are noticing.
6. Plant the seeds and continue to investigate.

Lesson Two: The Mesquite Seedpod and Seed



There are three common species of Mesquite: Honey Mesquite (*Prosopis glandulosa*), Screwbean Mesquite (*Prosopis pubescens*) and Velvet Mesquite (*Prosopis velutina*) found in the deserts of the Southwestern United States. All are deciduous and have characteristic bean pods which have long been used by humans, wildlife and livestock as a food source. Mesquites grow alongside desert washes and streams, plains and hillsides, often in thickets below 5,500 feet.

1. Pass out mesquite seedpods to each student. Allow them time to observe and discuss.
2. Pass out science notebooks and have the students record their observations of the mesquite seed pods along with a sketch. If you have enough seed pods, allow the students to tape or glue a seed pod into their science notebook; or you could have the students place a seed pod into a snack-sized plastic bag and staple it into their science notebook.
3. Show the students a seedpod that you opened. **Note:** Soak seedpods in water overnight to soften. Then, use snippers to open the pod exposing the seeds. Prepare ahead of time. Keep one pod aside to show the students how you harvested the seeds.
4. Give each student a few mesquite seeds to examine using a hand lens. They should again record observations and a sketch in their science notebook. If you have enough seeds, allow the students to tape or glue a seed into their science notebook.

Lesson Three: Desert Soil

Note: Students should wear safety goggles when working with soil samples.

1. Pass out plastic spoons, hand lenses, and a paper plate to each group containing a sample of sandy soil and potting soil for the students to observe and compare. Allow students time to review and discuss the composition of the two soil samples as a group.

2. Ask the students to record observations and a sketch of each of the soil samples in their science notebook. Students may also use tape to gather a small soil sample and then tape it into their science notebook for later reference.
3. Call the students back together and review what they noticed about the two soils. You may want to chart observations using a Venn diagram. It is important for the students to notice that the sandy soil is sandy and has more space between the grains of sand, than potting soil which sticks together.

Lesson Four: Preparing Mesquite Seeds for Planting

Note: In nature desert seeds have very thick coats to protect them from animals. When the seeds fall from a desert plant or tree they land on the sand, which rubs the seed over time much like sandpaper. The sand rubs off some of the protective seed coat. Therefore, the students will need to prepare their seeds by performing the work of the sand in the desert environment.

1. Share the above information with the students. Explain that the mesquite seed has a hard pod to protect the sweet seed from hungry animals. Tell the students that today they will help prepare their seeds for planting.
2. Instruct the students, while you model how to place two tablespoons of sand and three mesquite seeds in the small vial or bottle. Then fill with water. You may want to post the materials list and directions at the materials table. Explain that once the container is filled with water they should secure the lid tightly and then shake the container simulating a flood. **Note:** As students gather their materials you may want to have them line up at the door and proceed with the shaking outside in case they spill.
3. Send groups of students to the materials table to gather supplies.
4. Begin shaking. As students work, move from table to table passing out small paper bowls.

5. After about 3 minutes, instruct the students to stop and carefully dump the contents of their container into a small paper bowl. They should dig through the contents to retrieve their seeds. Once they have located their seeds they should place the seeds back inside the container.
6. Instruct students to dump the contents of the paper bowls into a plastic basin at the materials table. After school pour the water and sand into a desert landscaped area at your site. If one is not available, dispose of the materials in a trash container, not down the sink.
7. Have the students write their names on a label or sticker and place on their seed container. Call groups back to the materials table and instruct them to add one oz. of water to their container and then store for use later. **Note:** Adding water to the container with their seeds will speed the germination process.

Lesson Five: Planting a Mesquite Seed

Note: This lesson should be done a few days after preparing the mesquite seeds for planting.

1. Ask the students to review what they learned about soil in the previous lesson. They should use their science notebooks for this discussion. Share out and discuss.
2. Explain to the students that they will be planting a mesquite seed using a mixture of potting soil and perlite. This mixture will model the desert soil that the Mesquite grows in.
3. Instruct students to pour both soil samples into the plastic tubs at their tables and to slowly mix the soil and perlite together. Model this procedure for the students. Pass out soil and safety goggles. **Note:** Mixing the two soils will allow the thin desert plant root structures to grow in the potting soil.
4. Next, ask one student from each group to go to the materials table and collect the following materials for each group member:
 - a. Small clear plastic cup (9 ounce)

- b. Computer label or sticker for their name
 - c. Each group's bag of seeds
5. Students should write their name on the label or sticker and place on the side of the cup. Fill the cup about two-thirds full with soil. Students should then collect two seeds from the bag. Show the students how to plant the seeds by pushing them into the soil with their finger.
 6. Students should sketch and record observations in their science notebook.
 7. Review plant needs with the students by posing the following question: "What do our mesquite seeds need in order to grow?"
 8. Collect the cups and place in a large cake pan or on a box lid and store in a sunny place. If you don't have a sunny location inside, then place the cups outdoors in a sunny location on a daily basis. Add a small amount of water weekly.
 9. Every two to three days allow students to observe changes and discuss and record their observations in their science notebook.
Note: After about one week students should observe a seedling appearing. In about two weeks they should be able to observe a spine or needle. Continue to observe the structure of the mesquite for about five weeks. If you have a mesquite tree at your school site, allow the students to take the seedling outside to compare its structure to that of the parent plant. If you don't have access to an actual tree, show the students a picture of a mesquite tree and allow them to compare the structure.

Lesson Six: Desert Cuttings



1. Show the students a picture of a prickly pear cactus. Tell them that you have placed a prickly pear pad inside a small foil pan for the students to observe. Explain that they should not handle the pad as it has fine needles that will get stuck in their fingers. Ask the students why they think the prickly pear has needles. (To protect it from hungry animals, and provides protection from the Sun.)
2. Allow students to observe and sketch a picture of the prickly pear pad in their science notebook.
3. After the students have completed their observations, pass out clear shallow $\frac{1}{4}$ liter containers filled half-way with the potting soil/perlite mixture. Tell the students that you will be planting their pad in the soil using pliers for protection. They will observe the pads for the few weeks to see if they can grow. Students should predict what they think will happen.
4. The prickly pear will grow roots and continue to grow. Allow students to observe the prickly pear for about four weeks. Then, use the pliers to gently remove the prickly pear from the soil to expose the root system for the students to observe; they should record their observations and sketch the root system in their science notebook.

Extension:

Visit http://www.desertusa.com/magooct97/oct_pear.html for recipes and products made from the Prickly Pear.

Unit Extensions:

- Read *Deserts* by Gail Gibbons (ISBN 0-8234-1519-9). Locate the Mojave Desert on the map on page two. After reading the section on desert plants, chart desert plant adaptations. Note: Gail discusses both the mesquite and prickly pear. Have students add new learning to their science notebook.

- Read *Desert Life* by Alice Jablonsky (ISBN 1-877856-32-0) pages six and seven. Add to desert plant adaptations chart and science notebook.
- Read “How Do Plants Live in Deserts?” in *Living in a Desert* by Carol Baldwin (ISBN 140343224-4). Add new learning to the group chart and science notebook.
- Students can select a topic to research and report findings to the class through a written report, PowerPoint presentation or oral report. Possible topics: select a desert plant or cacti to research.
- The Nevada state flower is the sagebrush. It grows throughout the Mojave Desert. If you have an empty desert location near your school site with a sagebrush, take the students outside and stand around the plant. Encourage students to touch and smell the plant. Discuss observations. Let students record a sketch of the sagebrush in their science notebook. If you don’t have access to sagebrush, show the students a picture of Sagebrush and discuss.

Additional Resources

<http://mojavedesert.net>

This site contains information about the Mojave Desert; includes some wonderful digital photographs.

<http://www.springspreserve.org/html/home.htm/>

The Springs Preserve offers free school tours focusing on various topics relating to the Mojave Desert.

Vocabulary

Environment: Everything that surrounds and influences an organism.

Environmental factor: One part of the environment. An environmental factor can be non-living, such as water, light, temperature, or chemicals; or living, such as a plant or an animal.

Germinate: When a seed sprouts, or starts to grow and develop.

Organism: Any living thing, including all plants and animals.

Plant community: An area with a predictable associated group of plants.

Preferred environment: The set of environmental conditions that an organism appears to choose over other conditions.

Variable: Something that can be changed.

Safety Reminder

Students should wear safety goggles when working with soil samples.

Nevada State Science Standards

L5C2 Students know organisms interact with each other and with the non-living parts of their ecosystem. E/S

L5D1 Students know animals and plants can be classified according to their observable characteristics. E/S

N5A1 Students know scientific progress is made by conducting careful investigations, recording data, and communicating the results in an accurate method. E/S

N5A3 Students know how to draw conclusions from scientific evidence. E/S

N5A5 Students know how to plan and conduct a safe and simple investigation. E/S

N5B3 Students know the benefits of working with a team and sharing their findings. E/S

E5C5 Students know soil varies from place to place and has both biological and mineral components. E/S

L5A1 Students know some physical characteristics and behaviors that are inherited in animals and plants. E/S

L5B1 Students know plants and animals have structures that enable them to grow, reproduce, and survive. E/S

L5C5 Students know plants and animals have adaptations allowing them to survive in specific ecosystems. E/S

