



Seasonal Seeds

Grade: 2

Subject Areas:

Life Science, Social Science

Skills: observing, sorting, art, matching, predicting

Duration: 1-2 hours

Connections:

California history, plant science, agriculture, art, natural resources

Vocabulary

natural resources

Native American

seeds

flowering plants

fruit

drupe

pome

berry

dry fruits

characteristics

Objective:

Students will learn the different types of fleshy fruit and will apply this knowledge to local edible plants used by native Americans.

Materials

- a wide variety of local plant seeds
- a collection of more familiar fruits, nuts, and seeds
- a knife and cutting board
- labeled pictures of fruit types
- small paper cups
- glue (one bottle per two students)
- tree template on stiff cardstock
- thin cardboard and tacks for display purposes

Standards

Strands: Excellence in Environmental Education Guidelines

Strand 1 — Questioning and Analysis Skills: E) Organizing information:

Learners are able to describe data and organize information to search for relationships and patterns concerning the environment and environmental topics.

Strand 2.2 — The Living Environment: C) Systems and connections: Learners understand basic ways in which organisms are related to their environment and to other organisms.

Strand 2.3 — Humans and Their Societies: B) Culture: Learners understand that experiences and places may be interpreted differently by people with different cultural backgrounds, at different times, or with other frames of reference.

California State Educational Standards:

Life Science (LS) 2c: Students know many characteristics of an organism are inherited from the parents. Some characteristics are caused or influenced by the environment.

LS 2e: Students know light, gravity, touch, or environmental stress can affect the germination, growth, and development of plants.

LS 2f: Students know flowers and fruits are associated with reproduction in plants.

Investigation and Experimentation (I and E) 4c: Students will compare and sort common objects according to two or more physical attributes (e.g., color, shape, texture, size, weight)

I and E 4f: Use magnifiers or microscopes to observe and draw descriptions of small objects or small features of objects.

Background

Eating Plants

No matter how far back you go in time, human history is directly tied to the world of plants. Humans, because we are primates, can trace our earliest ancestry to living in the trees. Our good binocular color vision is just one adaptation that allowed us to harvest the right kind of plants.

At least 12,000 years ago, humans learned to cultivate plants. Before cultivation, human survival depended largely upon properly identifying plants and learning the various uses associated with them. Many foods, medicines, shelters, textiles and tools have been made of plant materials. This lesson will focus on seeds in particular and the important roles certain ones have had as food sources for local indigenous peoples.

California has a rich assortment of **natural resources**. Natural resources come from nature and are used by humans for survival or economic gain such as water, minerals and timber. Compared to all other states, it has the highest number of native plant species including many that are endemic (found only there). This high plant diversity is largely attributed to a mild Mediterranean climate, and the unique topography and geology of the area. It has been estimated that California supported a population of over 300,000 **Native Americans** (the first peoples to inhabit America). These groups were very diverse and spoke over 250 languages. Part of this diversity can be traced to the rich flora and fauna of the state.

Many animals, including people depend on plants for food. The energy locked up in plants is mostly in the form of carbohydrates. Starches are an important carbohydrate because they are high in calories. In modern times, there are three plants that provide almost half of all calories consumed by people. All three of these plant are grasses, and the food comes from their seed. These important grasses are rice, corn, and wheat. Other important seeds for food and drink include barley, soybeans and oats.

Mutual Relationship

Seeds are the embryo of a plant. They are only produced by **flowering plants** (plants with that flower). When a flower is fertilized, it goes through a transformation. The flower itself is an advertisement for sex. Many flowers depend on animals to pollinate them and have ways of attracting them like sweet nectar. Pollination differs from fertilization. In order for a flower to be pollinated, pollen is transferred

Local Connection

Madrone (*Arbutus menziesii*)

Some flowering plants can grow to be very old. The madrone tree can live over 400 years and belongs to the heath family. This tree gets its name from madrono meaning strawberry in Spanish. Its genus *Arbutus* is Latin for strawberry tree. Both of these terms reference the bright reddish orange berries madrone produces in the fall. These berries usually last for two years and are an important food source for many animals especially robins, band-tailed pigeons, and varied thrushes. Deer eat the white flowers which are pollinated by hummingbirds.

Apparently madrone was very sacred to various Native American tribes. The berries were eaten sparingly—cooked or raw. The bark and leaves were used to treat wounds, colds and stomach problems among other things. The tree has a thin reddish flaky bark that peels off revealing a satin smooth green trunk below. The beautifully grained hard wood is used in wood working. One of the largest madrones ever recorded was the Council Madrone located upslope from the Mattole River. Estimated to be over 500 years old, it stood 100 feet tall and 117 feet wide at its crown. In the wet winter of 2001, this specimen toppled. Madrone prefers a mild climate and usually lives in mixed forests. It ranges from California to British Columbia. Unfortunately, it appears to be susceptible to the fungus that causes Sudden Oak Death, *Phytophthora ramorum*. This disease is difficult to diagnose in madrone because other pathogens show similar symptoms.

to the top of the female part of a flower called the stigma. Pollen, once it settles on a stigma, sends out a tube that deposits sperm into the ovary of a flower. Inside the ovary of a flower rests the female eggs. Eggs are fertilized once sperm unite with them. Once an egg is fertilized by sperm, it grows and develops into an embryo. This embryo is a seed and is usually surrounded by a protective coat and a supply of food in the form of endosperm. A **fruit** is a swollen ovary that houses one or more seeds.

Seeds come in many forms. They have developed into clusters with sweet fleshy fruit to attract a host of animals. Animals help fertilize and disperse seeds through their droppings. Some fruits are fleshy while others are dry. Fleshy fruit can be very tasty and includes tomatoes, cherries, cucumbers, apples and citrus. The three main categories of fleshy fruit are drupes, pomes and berries. A **drupe** has one hard seed surrounded by a thick outer flesh. Apricots, plums, olives, peaches and cherries are examples of drupes. **Pomes** usually have their seeds contained in sections and the flesh is covered by a skin. Examples of pomes include apples, pears and quince. **Berries** have multiple small seeds and include kiwi, coffee berries and currants. Berries like blackberries and raspberries are a cluster of true berries. **Dry fruits** are housed in a seedpod. People don't usually consider them fruits, although technically, they are. Dry fruits include peas, green beans, nuts, and soybeans. Seeds, whether they are in a flesh fruit or a dry pod are very nutritious and a good source of carbohydrates and protein which is why they are highly sought after by animals, including humans.

Today, in modern cultures, goods are transported all over the world. When you shop at a grocery store, some of the food you buy may have been grown in places as far away as

Chile or China. However, step back in time, and the resources available for your tribe or family were found mostly within a hundred miles or less from your home. The food that one eats depends on the availability of resources.

Traditional Meals

Northern California is rich in natural resources. Many tribes in the northwestern corner, adjacent to the Pacific ocean, lived along streams that had an abundance of fish including salmon, trout and sturgeon. These peoples were considered riverine fishermen because a substantial part of their diet was fish. The peoples that lived within the King Range National Conservation Area fit into this category. Fish and other game were the main food sources and meat had to be supplemented by the gathering and eating of plants. Many different plants were harvested during different parts of the year.

Plants were harvested according to the season. There are many nutritional parts to plants besides seeds, including leaves and roots. In the spring, young shoots and leaves are at their best. In the summer, many different berries become ripe. Local prized berries include salal berries, blackberries, huckleberries and elderberries. These berries were dried by Native Americans to preserve them for eating through the cold, harsh winter months. Today many of these berries are still enjoyed by the people who harvest them. The berries from madrone trees, manzanita shrubs and buckeye were also eaten by Indians, even though they are very bitter (buckeye must be cooked first). In the fall, acorns and other nuts, like pine nuts and hazelnuts, were harvested. Acorns in particular were a very important food for Native Americans because they were nutritious,

abundant and could be stored for many months. Several methods were used to rid the acorns of tannins first. In addition, roots and bulbs were dug up and eaten including a potato-like plant called yampah or squaw potato. Certain grass seeds were surely eaten as well, however, most native grasses have since been replaced by exotic species. Because of the rapid decline in native grasses, understanding how they were integrated into the local Indian culture is not well known. It is known, however, that the local Indians used fire to maintain open coastal prairies and other grasslands.

The availability of seeds is dependent on many factors, including the season and normal variability in weather. Some fruits and nuts need long periods of cold weather. Acorn crops usually rotate between good and bad years. If rain or cool weather comes early, many berries don't have a chance to ripen. Late summer and early fall is the time most flowers have matured and developed seeds. This is the best time to collect a wide variety of local seeds. Whether the seeds collected are part of a nut, a grass or surrounded by a fleshy fruit, the rise of civilization could not have been possible without them.

Activity 1: Sorting and Observing Seeds

Preparation

Gather a variety of native plant seeds, nuts and fruits from safe and legal places. (see list above)

Procedure

1. Separate the collection of seeds into various piles and place them around the room for the students to see, touch and sort. There are many options of how this can be done. One option is to let the students sort them anyway they would like. For instance, they could sort them by color, shape or size. Another option would be to compare store bought fruits to the native ones. It is suggested in this activity, to review the basic types of fruits (pomes, drupes, berries, dry seeds, nuts, etc.) by having samples and pictures of them available. By looking at the pictures and comparing similar features, students will separate the various native plant samples out into piles after a brief introduction. (Rachel a matching worksheet would work well here)

2. To begin, show samples of fleshy fruits (pomes, drupes, and berries). Foods that work good for this are apples, avocados, and kiwis respectively. Be ready to cut them open to reveal the seeds inside. (have knife and cutting board handy) A good reference on the types of fruits is on the Internet at: www.theseedsite.com

3. Explain that scientists classify things based on similar features. Features that we look at are called **characteristics**. Describe a few of the characteristics for each fruit with input from the kids. For instance, an avocado

Materials

- a wide variety of local plant seeds (possible seeds include: madrone berries, chinquapin, manzanita berries, elderberries, blackberries, buckeye seeds, grass seeds, hazelnuts, pine nuts, buckwheat, salal berries, toyon berries, rose hips, snow berries, wild oat, acorns, fennel seeds)
- a collection of more familiar fruits, nuts, and seeds (possible seeds include: apples, avocados, berries, whole walnuts, sun flower seeds, pumpkin seeds)
- a knife and cutting board
- labeled pictures of fruit types

can be described as rough on the outside; smooth on the inside; one hard large seed on the inside surrounded by soft smooth green “flesh”; etc. After holding up each sample, write the names of the types of fruits. Next hold up examples of dry fruits (seeds and nuts). Ask similar questions as before. Have the students find similarities and differences between the dried fruits and the fleshy fruit samples. After the initial discussion, explain that one thing they all have in common is they are seeds. Briefly explain that people and animals depend on seeds for food; and that flowering plants depend on seeds to start the next generation of plants.

4. Seeds are embryos.

Next, place labeled drawings at each station. Separate the students into groups and have them sit next to the sorted pile of native seeds you have available. Give them time to sort the various seeds into similar piles. Walk around the room and assist the students when necessary. After they have sorted

- *What is the same about all three of these items? (show fruit)*
- *What is different about all three of these items? (cut them open)*
- *What is inside each one of these? (seeds)*
- *Where does a fruit come from?*
- *Do all plants produce seeds? What is your favorite fruit?*
- *Does anyone know of a local type of fruit?*
- *Are seeds important to wildlife?*
- *Are seeds important to people?*
- *Did the local Native Americans, collect seeds?*
- *What are natural resources?*
- *Are plants natural resources?*



Activity 1: Sorting and Observing Seeds (cont.)

them, have them pause while you talk about some of them in regards to Native Americans. Have some samples put aside for your own use so you can hold them up while you talk about them. As you talk about select native plant seeds, describe Indian uses, tell legends, and/or mention or show pictures of the plants from which they were produced. (This will depend on your background knowledge about these topics). You may want to include animal preferences for local vegetation as well. For instance, gray squirrels love hazelnuts and acorns. Once you tell something interesting about a particular plant,

have someone in each group hold up the same plant specimen. Repeat the name of the plant for reinforcement, and have someone repeat one of the things they learned about it.

- *What is the importance of a seed?*
- *Who eats seeds?*
- *What type of plants produce seeds?*
- *Can you name a fruit type?*
- *What type of animals eat seeds?*
- *Can we say that seeds are plant babies?*
- *What types of things does a seed need to grow?*

Activity 2: Designing a "Seed Tree"

Preparation

Gather a variety of native plant seeds, nuts and fruits from safe and legal places. (see list above)

Procedure

1. Using the various seeds, nuts and dried fruits, have the students create a unique "seed tree" (You may want to have a sample to show them). Have the students begin by adding a ribbon of glue along a tree branch using the tree template (see attached). Another option, especially for any older students is to have the students draw a tree. Next, have them press seeds into the glue and let it dry. This is time for creative expression using natural objects.

Materials

- a wide variety of local plant seeds (possible seeds include: madrone berries, chinquapin, manzanita berries, elderberries, blackberries, buckeye seeds, grass seeds, hazelnuts, pine nuts, buckwheat, salal berries, toyon berries, rose hips, snow berries, wild oat, acorns, fennel seeds)
- a collection of more familiar fruits, nuts, and seeds (possible seeds include: apples, avocados, berries, whole walnuts, sun flower seeds, pumpkin seeds)
- a knife and cutting board
- labeled pictures of fruit types

Alternative materials

To make the "seed tree" more interesting, bring in other natural items like moss, lichen, and dried leaves. You may even want to add pictures of native animals to put into the tree.

Let these art projects dry overnight. If they are heavy, staple them onto thin cardboard so they can be taken home or hung up for viewing without tearing.

Extensions

- Soak seeds overnight and then have the students dissect a seed to see the different parts
- Plant various seeds to see the rate of growth. While the plants are growing have the students measure, record and graph the results.
- Use seeds to introduce parts of a flowering plant. Have the students learn the important role pollinators have for flowering plants.
- Learn about Johnny Appleseed, an American legend through story telling or book reading.
- Make large paper mache flowers. Afterwards, have the students act out the part of a pollinator.
- Have a local beekeeper come in show the students a honeybee beehive.
- Take a nature walk looking for seeds on the forest floor.

References

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- The Biogeography of Pacific Madrone, <http://bss.sfsu.edu/holzman/courses/fall02%20projects/bioeog-raphy%20of%20pacific%20madrone.htm>
- Bittman, Roxanne, Plants, http://www.dfg.ca.gov/biogeodata/atlas/pdf/Plant_24b.pdf, 2011
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- Fruits, <http://theseedsite.co.uk/fruits.html>, 2011
- Heizer, R.F., Whipple, M.A., The California Indians, A Source Book, 2nd ed., University of California Press, 1971
- Heizer, R., Elsasser, A., The Natural World of the California Indians, University of California Press, 1980
- Further Reading:
- Lassik Indian History, www.accessgenealogy.com
- Pojar J., MacKinnon, A., Plants of the Pacific Northwest



CHINQUAPIN

http://farm4.staticflickr.com/3117/2803876731_fa24dd9b8f_o.jpg



WILD CURRANT

http://farm6.staticflickr.com/5081/5261540681_5d174aod83_o.jpg



MANZANITA

http://farm5.staticflickr.com/4048/4442225968_5f1677be94_b.jpg



THIMBLEBERRY

http://farm4.staticflickr.com/3466/3787022301_ba66fafbe8_b.jpg

Name: _____

Date: _____

Design a Tree

Design a tree by gluing down seeds below.

