

Ethnobotany: Tasting the Diversity of the Desert

“Ethnobotany is the study of the relationship between human culture and plants.”

Around the world, people from all walks of life utilize their environment for food, medicine, and material. The Sonoran Desert is no different, supplying the human community with a rich diversity of plant and animal resources. Workshop participants will have the ability to learn about native plants of the Sonoran Desert that have been traditionally used by the indigenous communities and desert plants that have been incorporated in modern agriculture. Also the workshop will promote the integration of local native plants into the American diet and the importance of conserving native plants to sustain genetic diversity. Participants will be able to touch, see, smell, and in some cases taste ethnobotanical material at the workshop. Come and experience the taste of the desert!

INSTRUCTORS:



Gina Marie Watkinson

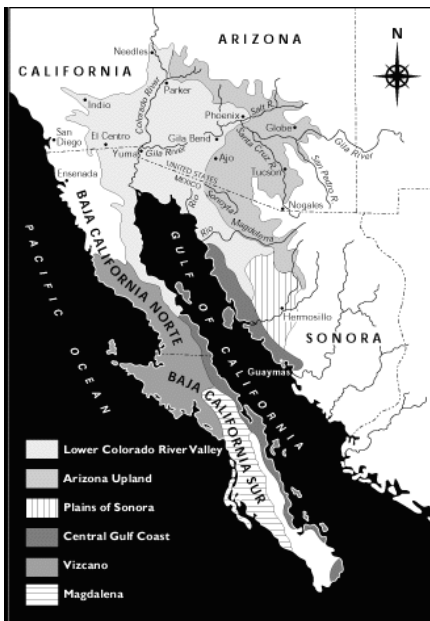


Kelly Arganbright

My name is **Gina Watkinson** and I am an employee at the Arizona State Museum at the University of Arizona. I am interested in culture and the interrelationships between people and their environment. On occasion, I take classes at the University of Arizona to broaden my knowledge in other areas of study outside anthropology. I chose to take this class because one of my responsibilities as an employee at the Arizona State Museum is to educate the visitors. The Sonoran Desert Discovery Class was a good way to connect my interest of the desert environment and to strengthen my presentation skills. I am also very passionate about food and eating healthy and consciously.

My name is **Kelly Arganbright** and I'm a student at the University of Arizona. I recently

completed a degree in chemistry and have decided that I would like to teach chemistry to high school students. I am now studying for a degree in science education. In addition to being a full-time student, I have worked in a research lab at University Medical Center in the department of pediatrics since 2005. We are studying necrotizing enterocolitis, an intestinal disease of premature babies that currently has no cure. I also work as the pole vault coach at Tucson High School and this will be my fourth year of helping athletes achieve their athletic and educational goals. In my free time, I enjoy reading, backpacking, and hiking.



WORKSHOP CREATED:

Fall 2009

WORKSHOP PRESENTED:

November 21, 2009; 9:00 AM - 3:00 PM

TARGET AUDIENCE:

This workshop is suitable for all ages. It provides a craft section intended for children between the ages of 3-13 years old and a large component geared for adults of all educational levels.

INTRODUCTION:

Living in an urbanized area that sprouted in the middle of the vast Sonoran Desert, many citizens of Tucson, Arizona don't realize the immense diversity of plants and animals inhabiting the land. Throughout the centuries, the peoples of the Tucson area have evolved with the land, historically relying on the local plants and animals as sustenance. Just as desert plants evolved mechanisms to survive harsh desert conditions, native tribes developed survival techniques, finding ways to incorporate the desert botany into their daily lives. However, as people's lives have modernized, convenience has become the root of many families' dietary habits. Cultivation of the land around Tucson has diminished and true appreciation of natural desert resources is minimal. Through the workshop, participants will be motivated to preserve our natural resources and develop an understanding of the relationship between humans and environment. It will also promote an awareness of the vast sources of food that can be acquired from the desert. Most importantly, participants will discover why genetic diversity is so important to our world.

BACKGROUND:

The environment has played a critical role in shaping human culture and conversely people have a tremendous impact, good or bad, on the land which they live. Ancient native peoples of the Sonoran Desert, which include the Hohokam, Mogollon, Salado and Sinagua were able to adapt to their environment by exploiting the native plants. They used these plants in various ways including food, medicine, material, shelter, and for utilitarian purposes. Desert plants were also an important part of their ceremonial rituals and folk lore. For example, one of these rituals includes harvesting of the saguaro fruit. The Tohono O'odham people harvest saguaro fruits with long poles made of saguaro ribs. They eat the juicy fruit raw or cook it down into sweet, nutritious syrup.

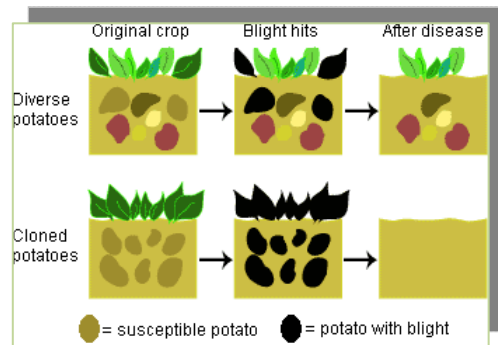
The indigenous people of the southwest not only used/use these foods to eat or for rituals but they were extremely knowledgeable about the plants lives and their significance to the desert ecosystem. Many of the different peoples of the southwest raised wild plants and animals. Their management and use of a diverse range of plants helped them to survive under sometimes difficult conditions.

The Sonoran Desert, surrounding the Gulf of California in the southwestern United States and northwestern Mexico, covers some 320,000 square kilometers. It includes a part of the state of Arizona and a small portion of California in the United States, western Sonora, and the southern two-thirds of the peninsula of Baja California in Mexico.
*Sonora Desert Map. Gathering the Desert. University of Arizona Press, 1987. by Gary Paul

Modern Agriculture

Modern agriculture has evolved into the practice of raising genetically uniform crops and livestock. Present-day crops are highly productive and efficient, but their reduced genetic variability makes them vulnerable to diseases, pests, and other changes in environmental conditions

In many cases, crops are being grown in areas that cannot support this type of plant or livestock. Overconsumption of soil resources, such as water and minerals, detrimentally affects the environment by reducing what is available for other plants. For example, crops that are not adapted for the hot and dry desert environment will need lots of water to survive, even more than they usually require. Given the finite supply of water in the desert, this type of crop further exhausts the available resources. Humans are becoming more dependent on a few highly productive varieties, and on global, rather than local, food production. This greater dependence on varieties with little genetic variability has the potential for worldwide impact, should environmental change arise.



This illustration demonstrates the vulnerability of monoculture.

*Sociological Images Website. Accessed 10/03/09
[\(http://contexts.org/socimages/2009/01/23/monocultures-genetic-diversity-and-the-social-landscape/\)](http://contexts.org/socimages/2009/01/23/monocultures-genetic-diversity-and-the-social-landscape/)

Food Security & Disease

One particular threat to mass producing plants for harvest is their susceptibility to diseases. A species has a range of genetic variability that allows for individuals and/or populations within that species to survive should a stressor or disturbance occur. In the case of Industrial agriculture, this is a tricky business to ensure, as seeds are planted under uniform conditions. **Monocrops** are an example of agriculture that potentially elicits low crop diversity. In a monoculture, if a single spore infects one leaf and produces more spores, many will have a high chance of success because they will land on identical susceptible leaves wherever they are dispersed. It is possible that a single pest or disease could wipe out entire area of a crop due to this uniformity. One of the more historically known examples of harvests that suffered from low crop diversity was the Irish Potato Famine of 1845-1847.

Monoculture

Monoculture describes the practice of relying on a very small number of genetic variants, or cultivars of a food crop for commercial agriculture. In modern agriculture, most food crops are now grown in large, monocultural plots. In order to maximize uniformity, few varieties of each type of crop are grown. These varieties are often selected for their productivity, uniformity, their ability to withstand mechanical picking and cross-country shipping, their tolerance to pesticides, and industrial agriculture routinely trades off food quality for quantity. Nutrition, flavor, and variety are frequently the last concern, if at all a concern. **Heirloom Gardening** and sustainable agriculture are reactions against this trend. The more we hybridize, the more we shrink the gene pool, and the narrower a species' pool, the more vulnerable it becomes to disease, weather changes or infestation.

Heirloom Plants

Heirloom plants are typically open-pollinated cultivars that were grown prior to widespread use of hybridization. Due to their genetics, they are often resistant to local pests, diseases, and have adapted over time to whatever climate and soil they are native to.

To be considered a heirloom, plants must be open pollinated. **Open pollinated** plants are created by the natural visits of bees and birds rather than human intervention. Vegetables and flowers are passed down through seeds whereas fruit trees are continued with grafts and leaf cutting. This type of procedure allows the plant to maintain consistent characteristics throughout the generations. Plants grown from the seeds of open-pollinated plants tend to produce plants that resemble the parents. (<http://www.halcyon.com/tmend/define.htm>)

The preservation of **biodiversity** and **genetic diversity** are important elements to heirloom gardening. The traditional varieties of crops or heirlooms emerged through many years of evolution. In most cases they developed at the margins of natural ecosystems and constantly exchanged genes with their wild relatives, making them a rich genetic reservoir.

Health

Modern agriculture, and consequently the corresponding Western diet custom, is not only detrimental to desert ecology, but current research shows a correlation with increasing health problems (Rodriguez-Moran 2008). Native people have evolved over thousands of years with a diet high in fiber, complex carbohydrates, and in general, well balanced. The change to a diet high in fat and simple carbohydrates and low in fruits and vegetables has caused and continues to cause health problems. Research has been done to assay health statistics of two tribes of Native Americans. Rodriguez-Moran, et al. surveyed the diets of Yaquis and Tepehuanos Indians in Mexico in relation to the prevalence of cardiovascular risk factors such as obesity, hypertension, and diabetes. Studies show that nearly one in five Yaquis Indians have diabetes and have almost a 50% obesity rate in both men and women. In contrast, Tepehuanos Indians surveyed had only one person with diabetes and an obesity rate of 11% in women and 1% in men. The research determined that the difference in health is related to diet. The Yaquis Indians are acculturated into a western lifestyle and diet high in saturated fats, whereas the Tepehuanos Indians are self-sustained, living off native foods.

Looking at ancient and modern native peoples of the southwest, we can learn about plants that have been adapted for surviving in the Sonoran Desert and which sorts of crops have been used without having a detrimental impact on the environment and our natural resources. In the process we can gain knowledge about plants, people, and local food.

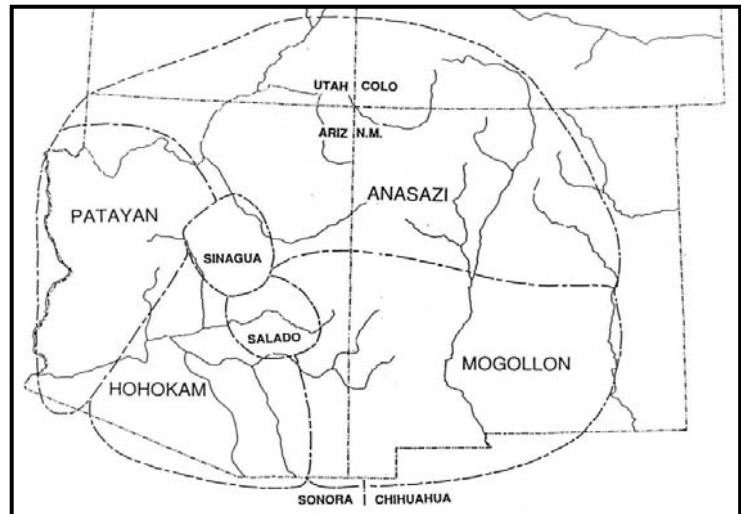
Ancient Peoples:

Hohokam

The Hohokam are known for their large irrigation canals; approximately three hundred miles of major canals were created for their crops. Their crops consisted of maize, lima and tepary beans, squash, tobacco, cotton, barley and amaranth. The Hohokam also gathered native wild plants including saguaro cactus fruit, prickly pear pads, cholla cactus buds, plantain, mesquite beans and agave from the wild desert.

Sinagua

Sinagua literally translates to “without water”. The Sinagua people practiced agriculture without a highly developed system of irrigation. However, they were still able to use rains by digging small ditches to collect rain. They farmed maize, beans, and squash.



* Native Seed Search. Indian Tribes of the Greater Southwest Map. Accessed 9/16/09

(www.nativeseeds.org/our_work/NAoutreach/seeds)

This map shows the Ancient Native American Indian civilizations of the Southwest. *

MAIN GOALS

The main purpose of this workshop is to facilitate learning:

- The functions, roles, and uses of plants in the Sonoran Desert
- The importance of plant diversity
- The benefits of integrating local native plant foods into our diet

Along the way, participants may find interest in learning:

- Plant names, both scientific and local
- The uses of plants in human material culture
- Recipes using native Sonoran Desert plants
- Kids craft activities from native Sonoran Desert materials
- Where to find more information regarding Sonoran Desert ethnobotany

CREDIT:

The bean dichotomy project utilized was an idea given to us by Martha Burgess, Ethnobotanist. Additionally, Lisa Falk, Director of Education at the Arizona State Museum, provided us with information about the preparation of yucca for the yucca paint brush activity.

ESTIMATED TIME:

Each activity, including discussion, should last approximately 2 hours. The total time for each activity can be adjusted depending on the grade level and the amount of background information that is presented.

OUTREACH GOALS:

Participants will learn some functions, roles, and uses of plants in the Sonoran Desert. There will be a greater appreciation for desert botany and heightened respect for nature, leading to a desire to protect and preserve natural resources.

Participants will understand the concept of genetic diversity and the importance of plant diversity in the aspects of ecosystem, evolution, and economics. They will understand the negative effects of monoculture. They will realize the consequence Western diet and lifestyle has had on human health, especially with native descendents.

Most importantly, participants will understand the necessity of integration of local native plant foods. With information about Native American history, plant recognition skills, recipe ideas, and an understanding of the importance of genetic diversity, participants will make changes in their lives to support protection and use of native plants.

MATERIALS:

Sonoran Desert Plants and Derivatives:

- Agave heart, agave nectar
- Chia seed
- Prickly pear fruit
- Cholla buds
- Mesquite beans
- Devil's Claw
- Heirloom beans

Material Products:

- Basketry

Craft Activity Items:

- Yucca
- Rocks
- Cochineal
- Water
- Glue
- Paper
- Coloring pages
- Colored pencils or crayons
- Scissors
- String

Presentation Objects:

- Maps of Sonoran Desert and native people distribution
- Posters with background information
- Bean soup
- Prickly pear candy
- Recipes
- Photographs of objects made with native plants
- Photographs of native species

PREPARATION:

Engage: Begin discussion to assess degree of familiarity with desert plant diversity. Ask participants to list as many cactus types as they can. Ask if they are familiar with any uses of these cacti. Ask how many different types of beans they have eaten or are familiar with.

For younger participants: This leads into discussion of how native people have used plants in their lives to make material products. This can lead into the paintbrush activity.

For older students: This leads into a discussion of genetic diversity and the importance of maintaining diversity in crops. The negative effects of monoculture can be taught. The bean dichotomy activity can follow.

For advanced students and adults: This leads into a discussion of genetic diversity and the importance of maintaining diversity in crops. The negative effects of monoculture can be taught. This leads into discussion of research showing the recent trend of health problems in relation to modern agriculture and Western diet.

Prepare:

Paintbrush Activity: Have precut yucca leaves for the students to use. Gather string, rocks, and scissors, as well as paint or dye (recommended cochineal (how and where collect) mixed with water).

Bean Dichotomy: Have mixture of beans and dichotomy sheets printed out.

Bean Dissection: Precook beans and gather plastic knives, magnifying glasses, rulers, pencils, coloring pencils, and worksheets.

General Workshop Items: Cook bean soup. Prepare prickly pear candy.

Step-by-Step Instructions and Worksheets: See following pages



Yucca Paint Brushes

There are many types of yucca represented in the Sonoran Desert and they come in all shapes and sizes. Most yuccas have leaves that are stiff and pointed. All yuccas produce a stalk that protrudes from the center. (Kane 2006)

Native American Indians of the Southwest were very resourceful people. They used what they could from the desert environment around them. Not only did they use these natural resources for food but for utilitarian objects as well. The example demonstrated here is a yucca paintbrush. Yucca paintbrushes are found in many archaeological sites throughout the southwest. They used these paint brushes to paint on pottery. Some Native American Indians still use this traditional technique today to paint modern pottery. The leaves of the Yucca were also used for making cordage and the roots were made into soap. Fruit and stalks and seeds were all used for consumption (Hodgson 2001).

Activity:

Make a paintbrush from the yucca plant. See how many yuccas you can discover in your neighborhood.

Materials:

Yucca Leaves

Small round rock

Scissor

Flat large rock

String

- 1) Explore your neighborhood and find a Yucca plant and two rocks, one large flat rock and a smaller rounder rock. Using your scissors, cut several leaves being careful not to poke yourself.
- 2) Place one of the leaves on the flat rock and take the smaller rounder rock and carefully smash, pound, and grind the yucca leaf into the flat rock. Repeat process with all of your leaves.
- 3) Bunch the leaves together and wrap the string around the bundle and tie it tight to hold the leaves together. Add as many leaves to each bundle as you would like. The thicker the bundle the thicker the paintbrush.
- 4) Carefully cut the yucca bristles with scissors to make the brush edge.

REFERENCES FOR YUCCA PAINT BRUSH ACTIVITY:

Kane, Charles W. 2006. Herbal medicine of the American Southwest: a guide to the medicinal and edible plants of the Southwestern United States.

Felger, Richard Stephen and Bill Broyles. 2007. Dry borders: great natural reserves of the Sonoran desert.

Hodgson, Wendy. 2001. Food Plants of the Sonoran Desert.

Yucca Photograph:

UBC Botanical Garden and Center for Plant Research Website. Botany Photo of the Day. Accessed 10/01/2009

(http://www.ubcbotanicalgarden.org/potd/2005/06/yucca_baileyi_v.php)

BEAN DISSECTION TEACHER PREPERATION

- Prepare the dry beans by soaking over night. If possible provide several different types of beans so participants can try activity several times if needed.
- Provide some background information about beans. Discuss what a hypothesis, experiment, and observations are by defining the terms.
- Provide a bean, knife, Bean Dissection Lab sheet, and other tools to each participant. Have them examine bean using a magnifying lens and measuring tape.
- Have the participants record their observations on the lab sheet. If possible have the participants share their observations.
- Provide the bean diagram sheet after they have completed the first part of the lab or ask participants to not look at last page of lab worksheet.
- If participants are unable to write provide bean diagram for them to color.



REFERENCES:

Bean Dissection Photograph:

Science Buddies. Tough Beans: Which Cooking Liquids Slow Softening the Most?.
Accessed 10/02/2009 (www.sciencebuddies.org/)

BEAN DISSECTION LAB

The Scientific Process

A good scientist has the ability to make detailed, reliable **observations**. Observations lead us to ask questions that start with “how” and “why.” To make an observation, you can use all five of your senses (hear, sight, taste, touch, smell). After making observations you can form a **hypothesis**. A hypothesis is a statement which tries to explain what you observed.

In this brief activity, you will practice making an observation, recording valid scientific information, making a logical hypothesis, and checking your hypothesis by performing an experiment.

Changed this to make the activity about observations not an experiment

Materials:

Cooked Beans

Magnifying Glass

Pencils

Plastic Knives

Rulers

Crayons or colored pencils

Activity:

- 1) Choose one cooked bean and describe the outside using your eyes as well as using the tools provided.

Color: _____

Size: _____

Shape: _____


Observations: _____

2) Hypothesize what the bean may look like on the inside.

3) Dissect the bean by carefully cutting it in half with the plastic knife provided. Examine the inside parts of the bean and record your observations.

4) Draw a diagram of the bean below with crayons or colored pencils.

Outside of Bean



Inside of Bean

5) Did the inside of the bean look like you thought it would? In other words, is your hypothesis correct? Explain parts that were the same as you predicted and parts that are different.

Terms: Can you describe these terms in your own words?

Observation:

Hypothesis:

DICHOTOMOUS BEAN KEY TEACHER INSTRUCTIONS

1. Give the students a copy of the bean dichotomous instructions and dichotomous key. Carefully go over the instructions.
2. Distribute the beans to each participant.
3. Have the participants identify the beans by using the key and using the tools provided.
4. Have the participants glue down the beans to the bean sheet when they are finished.
5. Check answers by referring to the answer key.
6. If time permits, try to have participants make their own dichotomous key.

Answer Key:

Black turtle Bean, Aztec Black Bean, Tampico	Scarlet Runner Bean	Anasazi Bean	Zuni Gold Bean	Aztec White Runner Bean, Bortal Bean, Mortgage Lifter
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DICHOTOMOUS BEAN KEY

This activity introduces participants to the use of a dichotomous key.

Dichotomous Keys:

A dichotomous key is a tool used to identify unknown things in the natural world. Keys consist of a series of statements describing characteristics of a particular living thing that eventually lead to its identification. The statements usually begin with broad characteristics which become more specific as you go through the key. Identification of unknown organisms are simplified by dichotomous keys and botanists and other scientists use these types of tools frequently.

Tips to understanding and using a dichotomous key

- 1) Always read both choices
- 2) Understand the descriptive terms in the key
- 3) If possible try to work with more than one sample
- 4) Keep notes on which statement you followed so if you make a mistake you can go back and you can also check your answer
- 5) If you are unsure which statement to choose, try both until it is apparent that one choice is obviously wrong
- 6) When measurements are given, use a measuring tool, do not guess
- 7) Once you have an answer, check this answer by looking for it in a reference book; a book with pictures is always helpful

Activity:

Using the beans provided, use the dichotomous key to identify each type of bean. Glue the beans to the card provided and label them with their common name. Don't forget to record your observations and use the tips to guide you through the key successfully. Compare your findings with the answer key when finished to see how well you did.



Photographs of Beans:

Native Seed Search. Bean Catalog. Accessed 10/01/09
(www.nativeseeds.org/catalog/index.php?cPath=1_14_41)

Dichotomous Bean Key:

1a.	Is the bean black	Black turtle Bean,Aztec Black Bean,Tampico
1b.	Is the bean not black	Go to 2.
2a.	Is the bean mottled and approximately a half inch long.	Go to 3a.
2b.	Does the bean look mottled.	Go to 4a.
3a.	Is the bean brown and black	Scarlet Runner Bean
3b.	Is the bean one colored	Go to 5a.
4a.	Is the bean purple and white	Anasazi Bean
4b.	Is the bean tan and white	Zuni Gold Bean
5a.	Is the Bean white	Aztec White Runner Bean, Bordal Bean, Mortgage Lifter
5b.	Is the brown yellow with a small white eye.	Yellow Indian Woman Bean

Place your bean onto the correct spot and glue down each bean when finished.

Black turtle Bean, Aztec Black Bean, Tampico	Scarlet Runner Bean	Anasazi Bean	Zuni Gold Bean	Aztec White Runner Bean, Bordal Bean, Mortgage Lifter
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RECIPES

Prickly Pear Candy Recipe

2 Quarts Cactus Cubes

3 Cups Sugar

1 Cup Water

3 Tbs Citrus Juice

Beware of spines/glochids/stickers when working with cactus!

Ask an adult to help remove spines and outside layer of cactus with a knife. Cut inside pulp in slices. Soak overnight in cold water. Remove from water, and cut into cubes.

Boil in water until tender. Drain.

Mix and heat remaining ingredients until sugar is dissolved. Add cactus cubes. Remove cubes, drain, and roll in sugar. ENJOY!

From:

Arizona Cook Book

The First Edition (1974)

Al and Mildred Fischer

Bean Soup Recipe (<http://www.flordemayoarts.com/pages/tomsmix.html>)

- 2 C (1 lb pkg) of Tom's Mix washed (Available at Native Seed Search)
- 3 quarts drinking water or stock
- 1-2 onions chopped
- 3-4 cloves garlic, minced
- 2 stalks celery, chopped
- 2 potatoes, diced
- 2 carrots, chopped
- 1-2 tomatoes or a 28 oz can whole tomatoes with juice, chopped
- Ham bone, bacon or other meat (optional)
- 1 chile pepper pod or 1 T chile powder (optional)
- Salt, or soy sauce, or Bragg's Amino Acid sauce, to taste
- (try 1 tsp lemon basil, cumin, oregano, epazote herb, or bay leaf for different effects; fresh cilantro as garnish when served)

In a large pot put cleaned, rinsed beans with water and bring to boil. Add all but salt. Cover, cook low heat 2-3 hours until beans are soft and liquid has thickened. Cover can be removed in last hour of cooking to speed thickening.

PHOTOGRAPHS:

☀ Incorporating the identification of plants with scientific and native names is a fun way to get familiar with the desert around us. Below are some images that will be identified during the workshop.



Agave



Prickly Pear cactus



Chiltepins



Indigo



Gourds



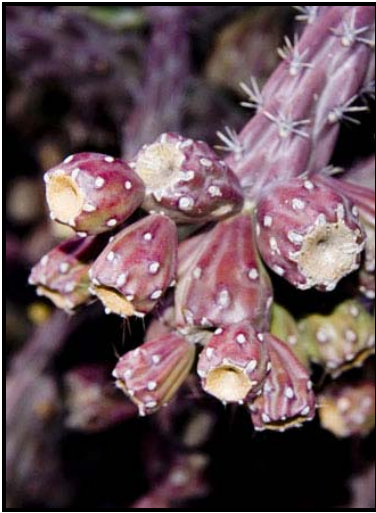
Devil's Claw



Saguaro



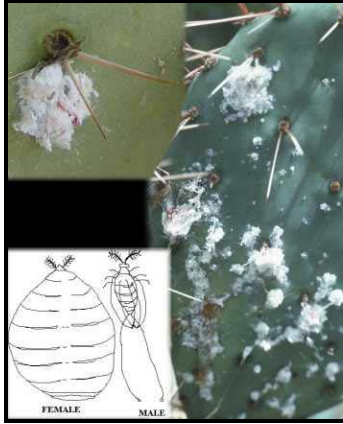
Cotton



Cholla



Tepary Beans



Cochineal

PHOTOGRAPH RESOURCES:

Man harvesting agave hearts:

(http://www.cbc.ca/dispatches/images/agave_harvest_portr.jpg)

Woman harvesting saguaro fruit:

(<http://www.nps.gov/archive/tuma/sharvest.jpg>)

Sonora Desert Map:

Gathering the Desert. University of Arizona Press, 1987. by Gary Paul Nabhan

Potato Famine Diagram:

Sociological Images Website. Accessed 10/03/09

(<http://contexts.org/socimages/2009/01/23/monocultures-genetic-diversity-and-the-social-landscape/>)

Indian Tribes of the Greater Southwest Map:

Native Seed Search. Indian Tribes of the Greater Southwest Map. Accessed 9/16/09

(www.nativeseeds.org/our_work/NAoutreach/seeds)

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Accessed 10/02/2009 (www.sciencebuddies.org/)

Photographs of Beans:

Native Seed Search. Bean Catalog. Accessed 10/01/09

(www.nativeseeds.org/catalog/index.php?cPath=1_14_41)

Agave:

Floria Cyberia website. Agave American. Accessed 9/20/09

(www.floracyberia.net/spermatophyta/angiospermae/monocotyledoneae/agavaceae/agave_americana.html)

Prickly Pear:

Declan McCullagh Photography Website. Flowering prickly Pear. Accessed 9/20/09

<http://www.mccullagh.org/photo/1ds-4/prickly-pear-cactus-flowering>

Chiltepins:

Native Seed Search Website. Chiltepins Catalog. Accessed 10/01/09.

(www.nativeseeds.org/catalog/index.php?cPath=1_14_41)

Indigo:

Native Seed Search Website. indigo Catalog. Accessed 10/01/09.

(www.nativeseeds.org/catalog/index.php?cPath=1_14_41)

Gourds:

Native Seed Search Website. peyote ceremonial Catalog. Accessed 10/01/09.

(www.nativeseeds.org/catalog/index.php?cPath=1_14_41)

Devil's Claw:

Evil Nature: Nature wants you dead Blog. Devils Claw Seed Pod. Accessed 9/24/09.

(http://evil-nature.blogspot.com/2007_08_01_archive.html)

Saguaro:

Wikipedia Website. Saguaro Cactus. Accessed 9/20/09.

(http://en.wikipedia.org/wiki/File:Saguaro_cactus_in_Arizona.jpg)

Cotton:

Native Seed Search Website. Cotton Catalog. Sacaton aboriginal. Accessed 10/01/09.

(www.nativeseeds.org/catalog/index.php?cPath=1_14_41)

Teapry Beans:

Native Seed Search Website. Beans catalog. Tepary beans. Accessed 10/01/09.

(www.nativeseeds.org/catalog/index.php?cPath=1_14_41)

Cochineal:

Pima Community College Desert Ecology of Tucson, AZ website. Cochineal Bug (*Dactylopius confuses*). Accessed 9/20/09.

(http://wc.pima.edu/~bfiero/tucsonecology/animals/arth_cobu.htm)

ITEMS FOR DISCUSSION:

What do you eat that comes from the desert?

How can you incorporate desert plants into your daily life? Why would this be beneficial?

What would happen if there was only one bean type? One cactus type?

What do you think would be the effect of further urbanization on desert diversity? Why?

What are some disadvantages of monoculture crops?

How have certain cultures managed to preserve their locally-adapted farming traditions?

ASSESSMENT:

The questions provided in the section titled "Items for Discussion" should initiate and promote conversation. If the students are able to ask their own questions about desert diversity and ethnobotany this should serve as an assessment as to how much they learned and retained from the activities. The activity lab sheets can also be easily evaluated and used to see whether they understood the terms.

BEYOND THE ACTIVITY:

Further activities that a teacher can do to connect the student with the topic include:

Organize a hike to explore the desert and collect materials for the workshop ex. Prickly pear fruit, yucca leaves, jojoba seeds

Have students bring in one object from the grocery store that has a plant ingredient native to the Sonoran Desert

Have students create their own Dichotomy chart

Each student can pick a plant native to the Sonoran Desert and research and present their findings to the class.

CONSULTANTS:

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Website: www.flordemayoarts.com



WORKSHOP ASSESSMENT

This workshop achieved all educational goals intended. Participants were shown various Sonoran Desert plants and how they can be eaten or used. Individuals learned the negative effects of monoculture and the importance of genetic diversity among plants. It was clear that having diversity within species protects diversity among species. Many children were able to use desert plants to create art and were appreciative of the nature around them. Most importantly, this workshop motivated people and got them excited about being a part of the desert. Many people came to the workshop not knowing that desert plants could be eaten. People left anxious to grind their own Mesquite flour, make prickly pear recipes, and plant native beans in their backyards. By teaching the public how Native Americans utilized the desert and showing them striking health statistics between two groups of present-day Indians, people were motivated to add these foods into their diet and share the knowledge of the importance of desert plants. Through completion of this workshop, participants should be able to identify Sonoran Desert plants and be familiar with some uses of each plant. They should understand the importance of native foods in the diet as well as the significance of genetic diversity within native foods.

REFINEMENT OF WORKSHOP

The template was changed by adding in actual statistics from studies conducted with tribes of Indians and the relation of their diets to health risks. Though this does not directly relate to ecology, it was a really important tool in reaching the public. Because people were presented with something they could relate to, they were motivated to listen and learn more.

Children were not asked to participate in the bean dichotomous key activity. Because the ages of children were either too young or too old, their interests were in other activities. Older children were interested in learning how to plant beans and have their own garden. Younger children were interested in making their own paintbrushes from yucca and creating an art project to take home. The dichotomous key would be better for an organized group of children who could take the time to complete the activity.

SUMMARY EVALUATION AND RECOMMENDATIONS

The workshop went really well. People were very interested in the topic and excited to learn about the desert surrounding them. Even people from other states were very interested to learn the ethnobotanical history of Native Americans. The workshop could have been improved by providing more resources for the public to take home, specifically information on how to harvest the desert plants discussed. Many people were so interested in using their own plants as food that it would have been beneficial to have guides for each item on how to harvest and prepare the plant to eat. On the given day, it would have been better to set up the workshop indoors so instructors could focus on dialogue rather than maintaining table organization due to the wind. The bean dissection lab was not completed. This activity would be better for a classroom-based workshop due to the detailed procedure.

Having other class members available to help was important for maintaining order between groups of visitors. The staff at the biosphere was helpful in having tables and chairs set up for us before arrival so the workshop display was ready quickly. It would have been beneficial to have a surplus of products for food distribution so as to eliminate the need to fetch more bowls and spoons later.

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GLOSSARY:

☀Definitions are a vital step to introducing workshop participants to ethnobotany.

Ethnobotany – the study of the interactions between humans and their surrounding environment.

Culture - the set of shared attitudes, values, goals, and practices that characterizes an institution, organization or group.

Genetic Diversity- a level of biodiversity that refers to the total number of genetic characteristics in the genetic makeup of a species.

Ecosystem- the system of relationships between animals and plants and their environment.

Sustainable Agriculture- friendly methods of farming that allow the production of crops or livestock without damage to the farm as an ecosystem, including effects on soil, water supplies, biodiversity, or other surrounding natural resources.

Ecology- the study of the interactions of living organisms with each other and with their environment.

Adaption- is the process whereby an organism becomes better suited to its habitat.

Agriculture- the production of food and goods through farming and forestry.

Domestication- the process whereby a population of animals or plants, through a process of selection, becomes accustomed to human provision and control. A defining characteristic of domestication is artificial selection by humans.

Monoculture- the cultivation of a single crop.

Genetic variability- a measure of the tendency of individual genotypes in a population to vary from one another.

Biodiversity- the variation of life forms within a given ecosystem, biome, or for the entire Earth. Biodiversity is often used as a measure of the health of biological systems.

Natural resources- occur naturally within environments that exist relatively undisturbed by mankind, in a natural form. A natural resource is often characterized by amounts of biodiversity existent in various ecosystems. (economically referred to as land or raw materials)

ENGLISH

Monoculture

Genetic diversity

Ethnobotany

Culture

Adaption

Agriculture

Domestication

Genetic Variability

Biodiversity

Natural Resources

Ecology

Ecosystem

Sustainable Agriculture

SPANISH

monocultivo

diversidad genetic

etnobotánica

cultura

adaptación

la agricultura

domesticación

la variabilidad genética

la diversidad biológica

los recursos naturales

Ecología

Ecosistemas

Agricultura Sostenible

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