Plant Adaptations for Arid Lands

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Discuss: What are some of the issues plants have to deal with living in an arid (dry) place?
Adaptation

(noun)
A change by which an organism or species becomes better suited to its environment.

- Physical change
- Behavioral change
Examples of Adaptation

**Physical** - A kangaroo rat does not need to drink any water; it gets what it needs from just eating seeds.

**Behavioral** - You do not spend time in the hot sun in the middle of the day, but instead seek shade and air conditioning.
A unique challenge for plants:
They can’t move!

- Can’t find a new place with more water
- Can’t move to shade

Let’s review some specific plant adaptations.

Take careful notes because you will be designing your own imaginary desert plant with its own adaptations.
Saguaro

- Spines dissipate heat and provide shade
- Stores water in body
  - Main column can get wide like an accordion
- Roots spread wide and shallow to gather rainwater
- Special photosynthesis process where stomata (pores) only open at night when it is cooler, so it loses less water

**Dissipate:** (verb) 1. To disappear or cause to disappear.
2. To lose (heat, electricity, etc.).
Creosote

- Leaves have thick, waxy coating to prevent water loss
- Leaves are small to prevent water loss
Palo Verde

- Leaves drop from tree in dry times
- Photosynthesis occurs in the leaves and the bark---notice that the bark/trunk is green
- Adds nitrogen to soil

Legume: (noun) Plants that have fruit or seeds of the legume family (i.e., beans, peas or clovers). They bear nodules on the roots that contain nitrogen-fixing bacteria.
Ocotillo

- Leaves only appear after rain, drop off when dry
- Has thick, waxy bark to retain water
Mesquite

- Small leaves to retain water
- Very deep tap roots, to find water underground
  - Near Pima Mine, AZ they found a root more than 300 feet deep!
- Adds nitrogen to soil
Guar

- Deep tap roots
- Needs to be watered only 3 or 4 times before beans are ripe
- Adds nitrogen to poor soils
- Likes heat, hates frost
Guayule

- Native to Chihuahuan Desert
- Produces rubber in the bark which helps it retain water
- Produces resins which keep insects away
- Gray leaves reflect sunlight
Activity:

Design an imaginary plant that can live well in the desert.

Draw a picture and label and list three adaptations for your plant that allow it to survive in the desert.
Author Biographies

**Traci Klein** grew up mostly in Massachusetts, then came west to go to Brigham Young University. She graduated with a BA in Comparative Literature in 1993. After a stint in Salt Lake City while her first husband went to medical school and their two boys were born, they moved to Tucson. Traci decided to switch fields and did graduate work in Plant Sciences at the University of Arizona and worked as a lab researcher for several years. After taking time at home to raise her sons, and after a divorce, she decided to dip her toes into education and began working as a long term substitute in the Baboquivari School District on the Tohono O’odham nation while taking online education classes. She received her teaching certificate and has been teaching 7th grade science at Valencia Middle School for 6 years. She has also been the MESA (Math Engineering Science Achievement) Club Advisor for 5 years. Currently, she is enrolled in the Masters in Educational Leadership program at Northern Arizona University and hopes to go into education administration.

**Matthew Katterman** is a PHD graduate student at the University of Arizona studying Biosystems Engineering. He is interested in irrigation engineering along with computer modeling of the guayule production system. He also has an intense interest in bioproducts and biofuels production. Matthew is a native of Tucson, Arizona, and received his Bachelor’s in Chemistry in 1997 as well as his Masters in Agricultural and Biosystems Engineering in 2004 from the University of Arizona.

**Sustainable Bioeconomies for Arid Regions Center of Excellence: https://sbar.arizona.edu**

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