



# Agriculture in Arid Regions: An Introduction

Authors: Arisbeth Ibarra Nieblas, Melissa Wilburn, and Corey Knox

## Standards

- **MS-PS1-3.** Gather and make sense of information to describe that synthetic materials come from natural resources and impact society
- **MS-LS2-5.** Evaluate competing for design solutions for maintaining biodiversity and ecosystem services.
- **MS-LS2-2.** Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

**Crosscutting Concept:** Stability and Change Small changes in one part of a system might cause large changes in another part.

## Materials

- PowerPoint 1: Agriculture in Arid Regions
- Handout 1: Plan your Crops: Profit (attached)
- Hand out 2: Plan your Crops: Water Use (attached)
- Multiple dice
- Calculators for each student or group
- White Boards and markers for review activity

## Resources

Sustainable Bioeconomies for Arid Regions Project Website, <https://sbar.arizona.edu/>

Article: Arizona farmers, pressured by grinding drought and urban sprawl, look for ways to save water (2:23minutes): <https://cronkitenews.azpbs.org/2018/02/09/arizona-farmers-look-for-ways-to-save-water/>

Arizona Agriculture in 60 Seconds: Video: <https://www.youtube.com/watch?v=WeTrVsEy5>

Guayule: <https://www.youtube.com/watch?v=jwEgHplnBR4> (3:25 minutes)

## Overview

In this lesson, students are introduced to the importance of agriculture in Arizona and the factors that influence what crops are grown and the resources involved (water). The lesson begins with a game where students choose crops for their 20 acres farm based on the profit of certain crops and water use. Students learn and use vocabulary related to sustainability, agriculture, and consider factors related to crops grown in arid regions. Students participate in discussions related to choices and factors that must be considered from both an economic and environmental perspective related to land use and agriculture.

## Learning Objectives

- Students will be able to define agriculture
- Students will be able to describe growing conditions and factors that influence the choice of crops in the Sonoran Desert
- Students will be able to compare and analyze the sustainability and feasibility of various crops grown in Arizona
- Students will be able to identify/name Guayule as an emerging sustainable crop

## Vocabulary:

- **Agriculture:** involves growing and harvesting crops and raising animals or livestock.
- **Abiotic Factors:** the non-living parts of the environment that can often have a major influence on living organisms including water, sunlight, oxygen, soil and temperature
- **Guayule:** a plant that is native to the southwestern United States and northern Mexico. The plant can be used as an alternative source of latex that is also hypoallergenic, unlike the more widely used Hevea rubber.
- **pH Levels:** A measure of acidity or alkalinity of water-soluble substances (pH stands for 'potential of Hydrogen'). A pH value is a number from 1 to 14, with 7 as the middle (neutral) point. Values below 7 indicate acidity which increases as the number decreases, 1 being the most acidic

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**Author Bios:** Arisbeth Ibarra Nieblas is a graduate student in Environmental Engineering at the University of Arizona. Melissa Wilburn is a sixth-grade teacher at Quail Run Elementary in Marana, Arizona. Corey Knox is a Research Scientist and curriculum developer at the University of Arizona, College of Education

Reviewed by: Torran Anderson and Cara Duncan, University of Arizona

## **Lesson Procedure**

**Presentation/PPT Part I:** Introduce the topic of agriculture through the showing of, “Arizona Agriculture in 60 Seconds: Video: <https://www.youtube.com/watch?v=WeTrVsEy5> a discussion and presentation of *slides 1-6* which define agriculture and provide statistics on the agricultural economy in Arizona. Encourage students to share experiences or knowledge related to farming, gardening, and other related topics connected to food, farming, and gardening.

### **Activity 1: Plan your Crops**

Hand out copies of the *Plan Your Crops* —Round 1: Profit and Round 2: Water Use

#### ***Round 1 (slide 7)***

Ask students to layout their farm and choose crops to gain the highest profit total.

*Give students the following instructions (see slide #7)*

- You have 20 acres of land, and you want to make the highest profit possible
- You have to plant at least 2 different crop types but no more than 5 different crops.
- Write directly on your crop grid. Shade in the area of each crop you will grow and write down the Crop type and the Profit per acre
- Add up the total profit of the farm you have planned and write the total profit on the grid.

#### ***Round 2 (slide 8)***

Ask students to layout their farm and choose crops with the same instructions as above. For this round they will write on their grids the Crop type and the corresponding Water use score.

*Record and Share:* Ask students to analyze their Crop grids independently. (slide 9)

- How do your two farms layouts differ?
- What is your total profit from Round 1?
- What crops did you grow? Why?
- What was your total water use score in round 2?

### ***Comparisons***

*Group Work:* Ask students to compare and discuss their results with classmates in pairs or small groups. (slide 9)

- What patterns do you notice?
- Which crops are high water use?
- Which crops create high profits?

(continued on page 3)

(*Arid Lands Agriculture*, pa. 3)

**Presentation/PowerPoint Part II:** Introduction to Agriculture and Arid Lands. (slides 10-14).

1. Present and discuss slides which include abiotic growing conditions in arid regions and examples of plants and abiotic factors such as soil, pH, sun, temperature, habitat.
2. Introduce one example of a plant/crop that is native to arid regions—Guayule.
3. Watch a short video on Guayule: <https://www.youtube.com/watch?v=jwEgHpInBR4> (3:25 minutes).

*Video Discussion Question:* Why might Guayule be a good crop to grow in Arizona/Arid Regions?

**Closing Discussion:** Ask students to return to their crop layout sheets and the notes from the activity. The following prompts can be used as a group discussion, individual assignment or assessment, or a think pair share (slide 16).

Prompts: Think about the farms you designed.

- What ideas do you have to reduce water use by agriculture?
- What are the qualities or characteristics of crops/plants we might look for to start growing on our farms?

**Optional Ending/Group Assessment-5 questions (slides 17-22)**

We use one whiteboard for each group and this ending quiz can also be used as an exit ticket activity or independent quiz or review.

- Question 1: Name five crops that are grown in Arizona?
- Question 2: List 3 abiotic factors that affect the type of plants we can grow in the Sonoran Desert.
- Question 3: What is agriculture? (It includes 2 things)
- Question 4: What plants are better suited to grow in our desert?
- Question 5: Why is agriculture important?

# Student Handout One

## Crop Grid: Round One - lowest water use score



SUSTAINABLE BIOECONOMY  
— FOR ARID REGIONS —


Student Handout Two

Crop Grid: Round Two - lowest water use score



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