



## Arizona Envirothon: Agriculture Study Guide

Agriculture is a critical component of Arizona's economy, as well as being the source for much of our food. While most residents of this state live in urban areas and have little awareness of the source of their food, our agriculture sector raises an incredible diversity of foods we can readily purchase in season, without the need for importing foods over long distances.

Although our state competition does not have an eco-station (testing area) dedicated to agriculture, it is an integral part of our environment and questions will be integrated into the four (4) major content areas.

Students should enter the competition with a *basic* understanding of the interconnectedness of agriculture with water, soils, forestry, and wildlife.

### Learning Outcomes

#### I. Agriculture and Soils

- Recognize there are many soil types, often on the same field of a farm or ranch.
- Explain the importance of the moisture-holding capacity of different soils.
- Select appropriate erosion prevention: dust BMPs (best management practices) for wind erosion and conservation measures for water erosion.
- Analyze implications of soil compaction upon crop production.
- Compare and contrast traditional farming methods of tillage and leveling with no-till practices and current technology.
- Evaluate the role of soil organisms in healthy soil (e.g., earthworms, bacteria, fungi, protozoa).
- Explain the challenges posed by soil pests (e.g., aflatoxin, nematodes).

#### II. Agriculture and Water

- Water is essential to all agricultural production.
- Sources of water used in Arizona agriculture include groundwater, surface water, rain.
- Water delivery systems to farms and ranches involve dams/canals, ditches, pumps.
- Irrigation systems are tailored to meet specific needs and may include furrow, flood, level basin, drip, sprinkler, and/or pivot.
- Livestock water on rangeland is usually delivered to stock tanks via windmill or solar pumps. Dirt tanks collect snowmelt and rainwater. Delivery lines link water from springs to holding tanks and stock tanks. Rangeland stock tanks also provide much needed water for wildlife.
- Dairies are regulated as "industrial" use by ADWR.

- Competing regulations create challenges to agriculture: ADWR places limits on water use, while ADEQ requires water is to be used for dust control.
- No new agriculture will be allowed in AMAs (Active Management Areas).
- Agriculture should use BMPs for water conservation: drip systems, scheduling based on soil moisture, lined ditches, drought tolerant crop species, collecting unused irrigation water in “sumps” at the end of fields for reuse
- Alkaline soils need more water to wash alkali below the root zone of plants.
- Integrated pest management (IPM) is a BMP to use while managing undesired non-native plants that can become invasive and compete for the available water, such as the Mediterranean Tamarisk Beetle. Weevil on thistle.

### **III. Agriculture and Forestry**

- Although there are very few in Arizona, tree farms are found in some areas of the state and provide nursery stock as well as wildlife refuges.
- Invasive plants and trees (e.g. Tamarisk, sweet resin bush, buffelgrass, tree of heaven, etc.) pose risks to native plants and can create un-natural wildfire conditions.
- Due to lack of normal fire regime, rangelands are overrun with pinon pine, juniper and native shrubs, inhibiting native grasses.
- Native ecosystems thrive when non-natives are removed by mechanical, chemical or biotic means.
- A century of fire suppression has created forests that are prone to uncharacteristic and un-natural wildfires.
- New, targeted pesticides help control without harming beneficials.
- BMPs for controlling undesired plants include mechanical and chemical measures, natural/biological controls, human labor, or a combination of all of these.
- Chemicals used to manage undesired plants pose risks as well as advantages: e.g., glyphosate - the active ingredient in Roundup – effectively eliminates plants but poses potential impacts upon humans and the environment.

### **IV. Agriculture and Wildlife**

- Grazing non-native livestock on public lands has extensive impacts on native plant communities by introducing non-native plants as well as detrimental impacts particularly to sensitive riparian habitat associated with federally protected species.
- Fences can impact movement for wildlife as well as, pose injury or mortality.
- Water developments for livestock supplies a much-needed resource for wildlife especially during drought conditions.
- On the other hand, wildlife may pose challenges to farmers and ranchers: e.g., gophers chew drip irrigation tape, wolves (apex predators) kill cattle, elk can damage fences, feral horse and burro populations are rapidly growing and competing with livestock for forage. Most horse herds in Arizona are feral with only one herd in Arizona are from Spanish horse descendants.

- Burros were imported to Arizona in the 1860's by prospectors, who abandoned them into the wild when they ceased their operations thus, they are feral also.

**Additional resources to prepare:**

- Ag & Soils:
- Ag & Water: APW Irrigation Activities
- Ag & Forestry:
- Ag & Wildlife