Key Topics & Learning Objectives 2019

Agriculture and the Environment
Knowledge and technology to feed the world

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KEY TOPICS (KT):

1. Agroecosystems function and the services they provide.
2. The importance of soil health as the foundation of a healthy ecosystem.
3. Sustainable agriculture on large and small farm operations, as well as the indicators of sustainable farming.
4. Sustainable and best management farming practices, and how they enhance and protect soil health, water quality and quantity, and biodiversity as well as manage insect pests, disease, and weeds.
5. Differences of local, regional, and national foods systems that are vital to grow food for an ever-increasing world population; and the importance of each food system.
6. New technologies that help provide more efficient agriculture production.

LEARNING OBJECTIVES:

1. Define agroecology. Apply ecological principles to agricultural systems by considering productivity, ecosystem impacts, and social responsibility. - **KT #1**

2. Describe indicators of soil health, including physical, chemical and biological properties and its role in the agroecosystem- **KT #2.**

3. Define sustainable agriculture, including comparing and contrasting sustainable practices on large and small farm operations- **KT #3**

4. Estimate the importance of moving toward sustainable farming systems to conserve natural resources, mitigate climate change, reduce erosion and protect water quality and quantity; as well as and promote pollination- **KT #4**

5. Describe farm management practices to build soil organic matter, such as: composting, crop rotations, cover crops, conservation tillage, and management intensive grazing systems to improve soil health.- **KT #4**

6. Compare best management practices that improve water quality and reduce water use such as conservation tillage, cover crops, plant selection, precision agriculture, water re-use, and sub-surface drip irrigation.- **KT #4**

7. Describe integrated pest management and biological pest control techniques used to prevent insect pest, disease, and weed problems.- **KT # 4**
8. Detail the role pollinators play in farming and ways to attract them. -**KT#4**

9. Describe the economic, social, and environmental benefits of sustainable agriculture to local communities, as well as to regional and global food systems. **KT #5**

10. Estimate the impact of new technology: agricultural biotechnology; precision agriculture; using UAV (drones, GIS, etc.) to increase farm efficiency for food production. - **KT #6**

11. Understand the risks and benefits of agricultural biotechnology. - **KT #6**

Precision Agriculture in Sustainable Farm Ecosystems

With every emerging technology comes a need to train operators to manage and exploit the new systems. This is true in most industries but especially in agriculture. The world's oldest industry is farming, and most societies maintain rich heritage and lore about how best to produce food. As Earth's population continues to climb over 7.7 billion people, land resources for food production are becoming more scare. More importantly, the competition for food production land is displacing natural ecosystems that support forestry and fauna. Optimizing farm operations to meet resource-limiting challenges requires combining age-old sustainable techniques with modern, emerging technologies.

Precision agriculture assumes that, with technological advances, it is possible to: 1) place the right treatment 2) in the right location 3) at the right rate 4) at the right time. To configure the treatment, the place, the amount, and the proper instance, a farm operator needs on-the-fly, real-time monitoring tools that estimate what actions are needed. Farmers need technology to help determine where their crops, and surrounding lands, are at risk. Mississippi soils and crops are at great risk because the soils in the MS River Delta are prone to wind erosion from over-tillage. Chemical fertilizers, applied at inappropriately high rates, are prone to enter the fresh water system. Pesticide over may expose Delta residents to harmful chemicals transported through the air.

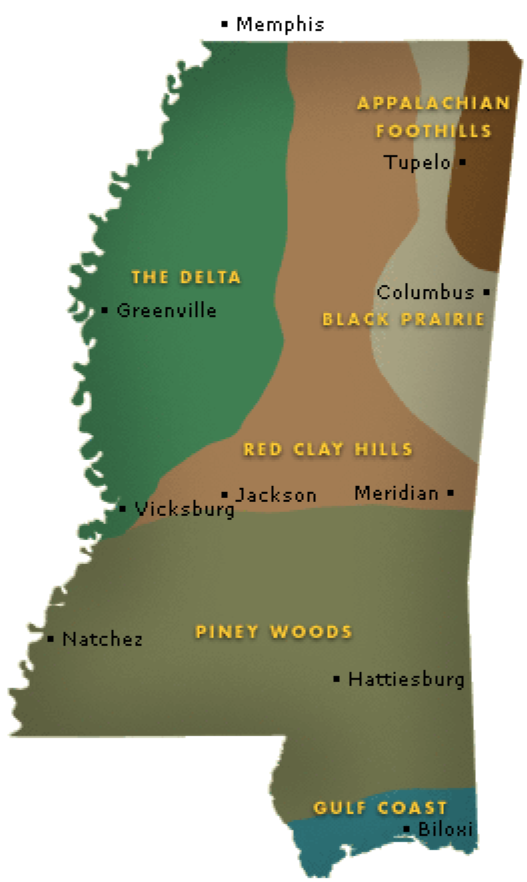
If farmers estimate crop status at any given time of the growing season, they can react with by applying appropriate, and often times minimal, treatments to mitigate problems. Fertilizers that boost production are most effective when applied to crops in early the vegetative growth stage. Insecticidal treatments; whether they be natural or chemical, are most effective when applied at early pest outbreaks. Irrigation should be delayed until soil reaches a critical point that no longer yields water to the plant. All of these examples require monitoring, or sensing, of crop and soil status.

Precision agriculture theories and practices do not negate the need for conservation and sustainable farming activities. These include:

- Reduced tillage to improve soil tilth and reduce soil loss to erosion,
- Mulching and cover crops to reduce soil erosion. More than likely, soil health will improve over time if both practices are implanted,
- Composting of vegetation and manure use, and
- Selecting drought resistant crops to help reduce irrigation.

Farm management strategies are optimized once basic sustainable practices are in place and precision technologies are operating to determine crop status. Through these Envirothon activities, students will learn about the tools available to: understand and improve soil health, engage in rational farm practices based on a broader understanding of agroecology, limit the use of harmful chemicals, apply emerging technologies strategically, and create a sustainable farm ecosystem.

Agriculture is the art and science of cultivating the soil, growing crops and raising livestock. ... Higher-technology farming involves crop rotation, which requires knowledge of farmable land.



MS Major Land Resource Areas
MS Arts Commission online at: http://www.arts.state.ms.us/folklife/view-by-region.php