

Plant Sciences

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Understanding Soils

Investigation

- Compare and contrast how soil layers may differ in undisturbed and cultivated sites.
- Describe different types of parent material in Tennessee.
- Explain how soils form (factors of soil formation).
- List different types of fertilizers.
- Construct a diagram of the soil food web and describe how it might differ in undisturbed and cultivated soils.
- Describe the ways that pH can influence the availability of nutrients in soil.
- List common cover crops used in row crop production.
- Contrast how soil is managed in a home garden and how it is managed in field crop production.

Experimentation

- Learn how to use web soil survey to determine soil types.
- Input different locations around your county and compare them in terms of suitability for agriculture (look at elevation, proximity to water, disturbances, etc.).

Agronomic Crops and Plant Breeding

Investigation

- Compare row crops grown in Tennessee with those in other areas of the country (Texas, Nebraska, North Dakota).
- Select a fiber crop and investigate the production methods.
- Model a crop rotation that takes into account the crop family, growing season and whether the crop is an annual or a perennial.
- Classify common crops by whether they are self-pollinated or cross-pollinated.



- For the crops that are cross pollinated, classify them as to the method of pollination (wind, insect, etc.).
- Describe and investigate some of the plant production in Tennessee that is not agronomic crops.

Experimentation

- Design a corn planting arrangement that will enable or prevent cross pollination, then test your design with white and yellow sweet corn.
- Research who has released some of the common crop varieties for sale currently (private companies or universities).

Crop Production in TN

Investigation

- Identify the environmental factors that influence growth and development in common crops (for example, what is the impact of day length?).
- Identify the environmental factors that could reduce or increase photosynthesis in crop plants.
- Describe an important difference in the way that corn and beans photosynthesize; how might that impact growth in different seasons?
- Describe the signs that a plant is experiencing stress from too much or too little water.
- Research the investments needed to begin crop farming (focus on land, seed, equipment).

Experimentation

- Plant sweet corn at different population densities (in row, between row) and compare the yield.
- Calculate seed costs for corn planted at different seeding rates.
- Visit a local crop producer and discuss with the grower some of their challenges and methods for addressing these challenges.

Crop Management — Insects, Diseases, Weeds

Investigation

- Research different resistances available in field crops to the most common insects and diseases.
- Compare and contrast resistances available for the most common field crops (corn, soybeans) and a minor crop.
- Describe the ways that decisions about tillage in fields can impact weed management.
- Compare the pest control materials allowable in organic production with those used in conventional production.

- List the pros and cons of different types of insect management (seed treatment, resistance, insecticide application).
- Compare application restrictions for general and restricted use pesticides.
- Describe production practices that can increase disease risk.

Experimentation

- Look up guides on weed, insect or disease management in one of the major field crops; develop your own recommendations for management of a specific weed, insect or disease; and identify environmental and economic impacts the management option can have.
- Scout a soybean, corn, cotton or wheat field for pests (weed, insect and/or disease), and identify the pest and management options for it.

Understanding Pesticides

Investigation

- Research each of the following: the Fungicide Resistance Action Committee (FRAC); the Insecticide Resistance Action Committee (IRAC); and the Herbicide Resistance Action Committee (HRAC).
- Investigate factors important in deciding on appropriate pesticides (fungicide, insecticide, or herbicide) to manage a specific pest.

Experimentation

- Create your own poster explaining different modes of action from five different pesticides in one of the main classes (i.e., herbicide, insecticide or fungicide).

Past, Present and Future of Crop Farming

Investigation

- Compare and contrast at least three of the advances in breeding that changed agronomic crop production.
- Describe the important factors and people that contributed to the green revolution.
- Investigate some minor crops that could increase in production area in the coming years (indigo, hemp, etc.).
- Rank the factors you think are most responsible for increases in crop production and be able to defend your reasons.

Experimentation

- Create a survey that can be given to friends and family or other residents who represent consumers that asks about their knowledge and perceptions of GMOs in agriculture.

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