EARLY HUMANS were hunters and gatherers. They foraged through woods and meadows, along stream banks, and around the shores of lakes and oceans searching for anything they could use for food, clothing, or shelter. These early people did not understand how plants and animals grew or how to grow them. Gradually, people began to culture crops and keep animals close by for milk, eggs, and meat. Agriculture began its evolution into the modern industry we know today.

Objectives:

1. Define agriculture and agricultural industry.
2. Identify important agricultural developments that occurred in early American history.
3. Explain the major technological developments that have occurred in agriculture.

Key Terms:

agricultural industry
agricultural technology
agriculture
food preservation
organic agriculture
pest
precision technology
Agriculture and the Agricultural Industry

Agriculture is the endeavor of providing products that can be used as (or converted into) food, clothing, and shelter. It focuses on raising animals and growing crops. Today, agriculture involves the application of science and technology. It is far more than farming.

The agricultural industry is all the functions involved in meeting the needs of people for food, clothing, and shelter. It is a large, diverse industry that includes taking the products of farms and processing them into desired and useful forms. Specialization occurs in nearly all functions, including farming, processing, and distribution. The agricultural industry is also commercial in that it produces products to sell to other people. This is far different from early agriculture, in which people were largely self-sufficient and produced primarily for the needs of their families.

Inputs for farming are also part of the agricultural industry. These include fertilizer, seed, feed, machinery, pesticides, and other inputs. Manufacturers and suppliers of inputs are often called agribusinesses. Agribusinesses perform many processes that support the production of plants and animals on farms.

Agricultural Developments in American History

Developments in agriculture have paralleled the evolution of areas of science, particularly the life and physical sciences. Agriculture is now sometimes referred to as applied agricultural science or agriscience.

Early agricultural efforts in America were carried out by Native Americans. Scientists believe that Native Americans came to the Americas from Asia some 11,000 years ago. These people were entirely hunters and gatherers. Early evidence points to the cultivation of potatoes and a few other plants about 10,000 years ago. Native Americans began to occupy the Mississippi River basin some 7,000 years ago, using sunflowers, cucurbits, and edible seeds as food. Evidence indicates that the cultivation of additional plants began about 3,000 years ago. Corn (maize) was introduced in North America 1,700 years ago but was not cultivated until 800 years ago. Though some plant cultivation was underway when the colonists arrived, most Native Americans still depended on hunting and gathering.
The first permanent settlement of colonists was at Jamestown, Virginia, in 1607. From here, settlers moved westward and southward. They cleared land and used it for crops (tobacco, amaranth, cotton, and grains) without regard to soil fertility. When the soil was no longer productive, they moved, seeking new areas to clear.

By the early 1800s, settlers had reached Illinois. They were more inclined to clear wooded areas than to attempt farming the prairie land. One reason for not farming the prairie land was the heavy nature of the soil and the inability of the simple tools to plow the land. The challenge of the soil led to the invention of tools that would plow the land. Various devices were created and tried. The moldboard plow developed by John Deere was a vast improvement over previous implements for tilling the prairie soil.

Early farmers in Illinois found the heavy prairie soil to be highly productive. Yields were greater than from easier-to-work soils back east. The early crops were wheat, corn, oats, barley, potatoes, and a variety of vegetables and fruits grown for home consumption. Horses and mules were used to provide power for farming in the 1800s but were later replaced by engine-powered tractors and implements. The 1900s saw great expansion in the use of power machinery, improved crop varieties, pesticides and other chemicals, and other forms of technology. No doubt, continued use of advanced methods of technology will occur in the twenty-first century.

An area that has emerged into prominence in recent years is organic agriculture, or organic farming as it is often known. **Organic agriculture** is the production of plants and animals without the use of manufactured chemical substances to effect growth and yield. With plants, organic agriculture involves using organic wastes and composts and using “natural” means to control pests. Producers use biological, cultural, and mechanical methods of weed and insect control. This is in contrast to the use of commercial fertilizer, pesticides, growth regulators, and genetically enhanced crop varieties. With animals, organic agriculture involves using feeds that are free of chemicals, antibiotics, and similar artificial substances. Of course, organic agriculture is not new—it is the way all agriculture was carried out a century or so ago! However, renewed interest in the late 1900s and early 2000s in organic agriculture has resulted in niche markets and producers who specialize in organic vegetables, meats, eggs, milk, and other products.
TABLE 1. Significant Events in American Agricultural History

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>1493</td>
<td>Christopher Columbus introduces calves, goats, sheep, pigs, hens, citrus, melons, and several kinds of vegetables.</td>
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<tr>
<td>1607</td>
<td>English colonists in Jamestown, Virginia, begin cultivating potatoes, pumpkins, grain, melons, cotton, oranges, and pineapples. (Some were not suited to the climate.)</td>
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<td>1609</td>
<td>Native Americans teach colonists how to grow corn.</td>
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<tr>
<td>1783</td>
<td>Improved cattle introduced (most likely of the Shorthorn breed).</td>
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<tr>
<td>1793</td>
<td>Eli Whitney invents the cotton gin; Thomas Jefferson invents a moldboard plow.</td>
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<tr>
<td>1798</td>
<td>John Chapman plants an apple nursery in Pennsylvania. (Chapman was known as “Johnny Appleseed.”)</td>
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<tr>
<td>1831</td>
<td>Cyrus McCormick invents the reaper in Virginia for harvesting grain. (The grain combine was patented in 1834.)</td>
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<td>1837</td>
<td>John Deere begins manufacturing plows.</td>
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<tr>
<td>1850</td>
<td>S. S. Rembert and J. Prescott develop a machine that picks cotton.</td>
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<tr>
<td>1855</td>
<td>First agricultural colleges established in Pennsylvania and Michigan.</td>
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<td>1856</td>
<td>Gail Borden patents the process for condensing milk.</td>
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<tr>
<td>1862</td>
<td>U.S. Department of Agriculture created; Morrill Land Grant Act passed to aid states in establishing agricultural and military colleges.</td>
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<td>1869</td>
<td>Spring-toothed harrow invented.</td>
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<td>1873</td>
<td>Barbed wire invented.</td>
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<td>1875</td>
<td>First silos constructed.</td>
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<tr>
<td>1881</td>
<td>Hybrid corn produced.</td>
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<td>1887</td>
<td>Hatch Act creates a system of agricultural experiment stations.</td>
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<tr>
<td>1888</td>
<td>Refrigerated rail car makes shipment from California to New York.</td>
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<tr>
<td>1892</td>
<td>First gasoline tractor made by John Froelich.</td>
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<tr>
<td>1917</td>
<td>Smith-Hughes Act enacted; provides for instruction in agriculture in secondary schools.</td>
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<tr>
<td>1921</td>
<td>First farm market report broadcast on radio.</td>
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<tr>
<td>1959</td>
<td>Mechanical tomato harvester developed.</td>
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<tr>
<td>1994</td>
<td>Use of satellite technology to manage farming practices introduced.</td>
</tr>
<tr>
<td>2005</td>
<td>First calf born to a cloned cow in research by Steven L. Stice.</td>
</tr>
</tbody>
</table>

Note: A number of inventions from Europe were introduced into American agriculture, such as planters, cultivators, and iron plows.

Technology Developments

Today’s agriculture is often said to involve high levels of technology. **Agricultural technology** is the use of inventions in the production of plant and animal products. Most inventions in the twenty-first century involve the application of science and knowledge gained through research. Biotechnology is an area that has made and will continue to make major
contributions to agriculture. But other areas of technology have also had important impacts on how we get our food, clothing, and shelter.

HOW TECHNOLOGY HELPS

Technology in agriculture is beneficial in a number of ways. Three major benefits are the following:

- Technology has made agricultural work easier. Power machinery has replaced human physical labor in doing much of the work. Internal combustion engines provide much of the power. Implements prepare the soil, plant seeds, control pests, and harvest crops. Technology in animal production has also had impacts on livestock, poultry, and aquaculture crops.
- Technology has increased the amount produced. Crops are selected and planted based on high yield potential. Practices are followed in crop production to ensure good yields. Harvesting methods are used that minimize waste and assure high quality. Technology has also affected animal agriculture. For example, one dairy cow now produces much more milk than a few years ago. Further, milking is with machines and dairy systems that help assure a quality product.
- Technology provides a higher standard of living. Because of the abundance of production using agricultural technology, people have higher-quality food products and more economical clothing. Fewer people are needed in agricultural production, releasing them to enter other occupations that promote higher standards of living.

FURTHER EXPLORATION...

ONLINE CONNECTION: Resources for Molecular Biology

The Molecular Biology Gateway has a wide range of information resources in areas of molecular biology. Most of these resources are useful to individuals interested in cloning and genetic engineering. Look at some of these resources for yourself and prepare a short report on your findings. The Web site is:

http://www.horizonpress.com/gateway/
EXAMPLES OF TECHNOLOGY

A detailed description of the application of technology in agriculture/horticulture is far beyond the scope of this e-unit. However, four broad technology examples are included here.

♦ **Plant improvement**—Plants have been improved in a number of ways using hybridization, selection, genetic engineering, and other approaches. Plants have been improved for yield and quality of product. Plants have been developed that are resistant to pests and the chemicals that control pests. User-friendly plants, such as the seedless grape, were developed through technology.

♦ **Pest management**—A **pest** is any living thing that causes injury to plants, animals, or property. Reducing losses to pests has long been a goal in the use of technology in agriculture. Pesticides have been developed that

FIGURE 4. Modern pesticide application equipment promotes efficiency in agriculture. (Courtesy, AGCO)
destroy weeds, insects, and other pests. Alternatives to the use of pesticides are now being promoted as part of sustainable agriculture and organic farming. Lower levels of pesticides are possible through good crop observation and management practices.

- **Precision technology**—**Precision technology** is the use of practices that allow the precise application of agricultural inputs. Rates of input application can be varied to meet immediate needs based on soil, water, and plant conditions. The approach uses a number of technologies, including global positioning, geographic information, equipment that senses rates of harvest and application, and computer-controlled application equipment. Information is gathered and stored about small surface areas of the earth, usually to within 1 square meter. Precision technology applies inputs, such as fertilizer, only on the areas of land where the inputs are needed.

- **Food processing**—Food processing includes a number of functions: grading, hauling, washing, preserving, storing, and packaging. A key area in today’s industry is preservation. **Food preservation** is the application of technologies to keep perishable food from spoiling and safe to eat. Canning, refrigerating, freezing, and drying are four food preservation methods. Refrigeration, for example, helps prevent spoilage of many foods, such as eggs, milk, and meat. When you go to a supermarket, you will see many food products that have been preserved in a variety of ways.

**Summary:**

Agriculture is the endeavor of providing products that can be used as (or converted into) food, clothing, and shelter. People were once hunters and gathers; they did not culture plants and animals for products to meet their needs. Practices have changed. Today, agriculture is carried out as a large commercial industry.

Many developments have contributed to the evolution of agriculture into a complex industrial system. Much change has occurred since the early colonists arrived. The colonists practiced agriculture to meet the needs of themselves and their families. Commercial agriculture appeared in the Midwest in the early 1800s as settlers arrived from the East. Plows, planters, harvesters, and other equipment were developed to allow production on prairie soils. In recent years, high technology has resulted in a very productive agriculture. Some producers are using organic production practices to meet niche market demands.

Technology developments have focused on plant improvement, pest management, precision technology, and food processing. These technology developments provide for a highly productive agricultural industry.

**Checking Your Knowledge:**

1. What is agriculture?
2. What is the agricultural industry? How is it greater than agriculture?
3. What is the history of agriculture as carried out by Native Americans?
4. Where was the first permanent settlement by colonists in America? What crops were grown?
5. What crops were produced early on in the prairie soils of areas such as Illinois?
6. What is organic agriculture?
7. Name three ways that technology has been beneficial in agriculture.

**Expanding Your Knowledge:**

Use print media and/or the Internet to read and learn more about the history of agriculture and the role of agricultural technology. Prepare a brief report.

**Web Links:**

- [Agricultural History Center](http://aghistory.ucdavis.edu/)
- [Agricultural History Society](http://www.usi.edu/libarts/history/AHS/)
- [Illinois Agriculture History](http://www.aces.uiuc.edu/~sare/)