

UNIT 5

Agriculture and Rural Land-Use Patterns and Processes

Chapter 11 *Origins, Patterns, and Settlements of Agriculture*

Chapter 12 *The Second and Third Agricultural Revolutions*

Chapter 13 *Spatial Arrangement of Agriculture*

Chapter 14 *Challenges and Consequences of Agriculture*

Unit Overview

About 12,000 years ago, people living in Southwest Asia began to intentionally grow crops and raise animals. From the beginning of agriculture in that region, and later in other regions, agriculture diffused throughout the world. The evolution of agriculture has been punctuated by four revolutions that have pushed agriculture and societies forward. Since 1750, mechanization, the use of chemicals, and research have dramatically increased agricultural productivity. Additional advancements have increased productivity and allowed more people to work outside of agriculture, but these advancements have increased stress on the environment.

Physical Geography, Economics, and Settlement Patterns

What people have grown and raised has always been shaped by the climate, soils, and landforms of a place. In addition, the types of agricultural goods that farmers produce, whether dairy or vegetables or grain, are heavily influenced by the nearness of the market. Farmers have also shaped the landscape by cutting down trees, draining wetlands, etc. Improvements in technology have shifted agriculture toward larger enterprises and greater interdependence.

Changes and Opportunities

Changes in technology and society influence how people produce and consume food. Historically, women have often been responsible for cooking, but as more women entered the workforce, more food has been prepared outside the home.

ENDURING UNDERSTANDINGS

1. Availability of resources and cultural practices influence agricultural practices and land-use patterns. (PSO-5)
2. Agriculture has changed over time because of cultural diffusion and advances in technology. (SPS-5)
3. Agricultural production and consumption patterns vary in different locations, presenting different environmental, social, economic, and cultural opportunities and challenges. (IMP-5)

Source: AP® Human Geography Course and Exam Description, Effective Fall 2020 (College Board).

CHAPTER 11

Origins, Patterns, and Settlements of Agriculture

Topics 5.1–5.3

Topic 5.1 Introduction to Agriculture

Learning Objective: Explain the connection between physical geography and agricultural practices. (PSO-5.A)

Topic 5.2 Settlement Patterns and Survey Methods

Learning Objective: Identify different rural settlement patterns and methods of surveying rural settlements. (PSO-5.B)

Topic 5.3 Agricultural Origins and Diffusions

Learning Objectives: Identify major centers of domestication of plants and animals. (SPS-5.A)

Explain how plants and animals diffuse globally (SPS-5.B)

To most people, this is just dirt. To a farmer, it is potential.

—Anonymous



Source: Getty Images

An aerial view of rectangular plots of land in Kansas showing the Public Land Survey System used in the United States. The circular shapes are created by using center-pivot irrigation systems. (See Topic 5.2 for more about survey patterns and Topic 5.10 for more on irrigation systems.)

Introduction to Agriculture

Essential Question: What is the connection between physical geography and agricultural practices?

Two physical elements have always shaped **agriculture**, the process by which humans alter the landscape in order to raise crops and livestock for consumption and trade. One is physical geography, such as soil types and landforms. The other is **climate**, the long-term weather patterns in a region. For example, coffee grows best on hillsides in warm climates, such as in Kenya or Colombia. Olives, grapes, and figs do well in the soil and climate near the Mediterranean Sea. Those foods became dietary staples for people in the region.

Economic factors also impact agriculture. For example, whether consumers want to purchase peaches or plums influences what farmers will grow.

Physical Geography and Agriculture

Agriculture is affected by physical geography in numerous ways. Animals and crops need water. Even cattle herders in the Sahel, a dry region on the southern edge of the Sahara, must have access to water. Nutrient levels in the soil influence what people can grow. For example, cotton needs nutrient-rich soil, while sorghum can grow in nutrient-poor soils, such as those in tropical rainforests.

Landforms also shape agricultural activity. Flat land in large, expansive valleys provides excellent landscapes for agriculture. In contrast, rugged land requires more human labor in order to make the land useful for agriculture.

Humans have altered the physical environment to increase agricultural production. They have used techniques such as irrigation, terrace farming, deforestation, desertification, and the drainage of wetlands. (See Topic 5.10.)



Source: Wikimedia Commons, Raoul Rives

Agricultural activities are dictated by physical constraints as well as the level of economic development of a region. Pictured above are examples of agricultural products and activity in Morocco

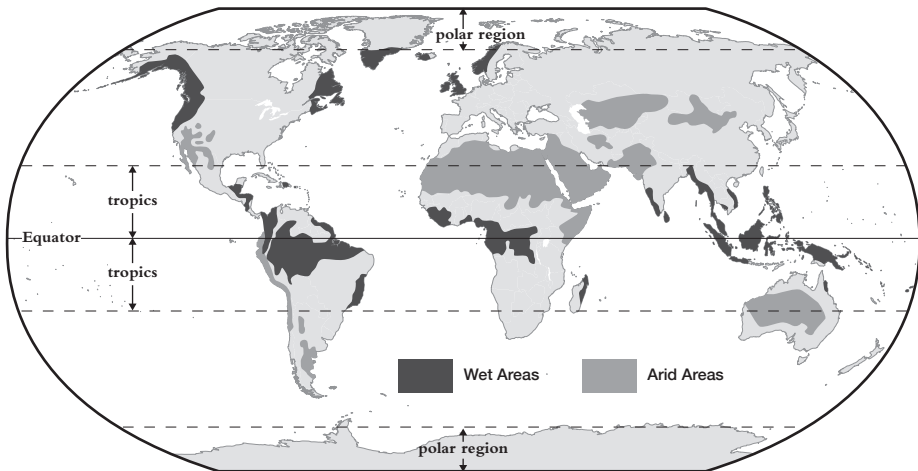
Climate and Agriculture

Despite human intervention, environmental and economic factors are often the most important influence on agriculture. They will determine what types of crops will be grown and what types of animals will be raised by farmers in many cases.

Climate Conditions and Agricultural Production

Climate always has and will continue to play a major role in determining what types of agriculture will take place throughout the world. Most of the earth's land surface supports some type of agricultural activity. The few exceptions are those that are considered to be physically extreme. These include land at highest latitudes or highest elevations, and areas with the highest or lowest precipitation. In these areas, population density for most of human history has been low

WET AND ARID AREAS OF THE WORLD



The level of development of a country and its access to modern technology can have a significant influence overcoming climatic obstacles. In the cold climates of Iceland and Greenland, farmers can grow crops in greenhouses. The tomato market, once dominated by sunny and warm U.S. states such as Florida and California, now includes the products of large Canadian indoor growing facilities.

The relationship between climate and cultural traits, such as food preferences, also shapes agricultural activity. The climate of Southwest Asia is fine for raising hogs. However, in a region dominated by Muslims and Jews, most people have religious objections to eating hogs, so farmers choose to raise other animals.

Economic Factors and Agriculture

Climate has a significant influence on agriculture, but economic factors also influence production. Many people across the world are involved in food production, but a significant difference is who consumes the food they produce.

Subsistence Agriculture The primary goal of subsistence agriculture is to grow enough food or raise enough livestock to meet the immediate needs of the farmer and his or her family. A secondary goal is to sell or trade any surplus for income or goods. Most subsistent farmers live in less-developed regions of the world and have small farms of fewer than two acres. Limited land and the expense of advanced agricultural technologies have made it difficult for subsistent farmers to grow excess food to sell or trade.

Commercial Agriculture The primary goal of the commercial farmer is to grow enough crops or raise enough livestock to sell for profit. It exists in all countries but is more common in developed countries. However, it has become increasingly common in semiperiphery countries, such as China, Mexico, and Brazil. To increase yields further, commercial farmers often use the profit from the sale of their products to purchase more land, equipment, and technology, or to pay for training in the newest farming techniques.

The interaction of economic factors and climate influences agricultural activities in many locations. For example, animal herding takes place in drier climates such as North Africa and parts of the United States and Canada. Animal herding practiced by pastoral nomads in North Africa is an example of subsistence agriculture. Their herds are generally smaller in size, and the milk, meat, and hides are used by the farmers and their families, rather than sold for profit. By contrast, cattle raising in the United States and Canada is commercial agriculture. Cattle roam the western prairies and feed on natural vegetation prior to being sold and slaughtered.

Intensive and Extensive Farming Practices

Another factor that influences agriculture is the amount and type of resources used to grow crops or raise animals. **Intensive agricultural** practices are those in which farmers or ranchers use large amounts of inputs, such as energy, fertilizers, labor, or machines, to maximize yields. **Extensive agricultural** practices use fewer amounts of the inputs and typically result in less yields. Every type of agriculture involves labor, resources, and capital. Consider these ideas as part of a continuum, or line, in which each agricultural activity uses resources more or less intensely than the others. (See Topic 5.6.)

Intensive Commercial Agriculture Heavy investments in labor and capital are used in this type of agriculture which often results in high yields and profits. **Capital** is the money invested in land, equipment, and machines. Intensive commercial agriculture is almost always capital intensive but can also be labor intensive. Examples include market gardening, plantations, and large-scale mixed crop and livestock systems.

Intensive Subsistent Agriculture This form of agriculture is often labor and animal intensive. For example, in rice paddies in Southeast Asia, most of the farming is performed using low-paid human labor rather than machines. The seedlings are planted by hand and during the harvesting process, laborers cut the crops and take the outer husks off to expose the grains of rice.

Extensive Commercial Agriculture This type of farming uses low inputs of resources but has the goal of selling the product for profit. Ranching is the most common example and can be found in the western regions of the United States and Canada, Argentina, New Zealand, and Australia. Typically, the human labor required for this type of agricultural activity is extremely low.

Extensive Subsistent Agriculture Few inputs are used in this type of agricultural activity. It is often practiced in areas that have climatic extremes such as tropical, semi-arid, or arid regions. Two examples include nomadic herding and shifting cultivation.

TYPES OF AGRICULTURE				
	Intensive Commercial	Intensive Subsistent	Extensive Commercial	Extensive Subsistent
Location	<ul style="list-style-type: none"> Global: core, semiperiphery, and periphery Regional: near transportation access to urban and global markets 	<ul style="list-style-type: none"> Global: primarily periphery and semiperiphery Regional: usually near towns and cities with access to local markets 	<ul style="list-style-type: none"> Global: core, semiperiphery, and periphery Regional: transportation access to processing and local, regional, and global markets 	<ul style="list-style-type: none"> Global: primarily periphery and semiperiphery Regional: usually in sparsely populated areas with limited access to local markets
Inputs	<ul style="list-style-type: none"> Labor: intensive Capital: intensive 	<ul style="list-style-type: none"> Labor: intensive Capital: not intensive 	<ul style="list-style-type: none"> Labor: not intensive Capital: intensive 	<ul style="list-style-type: none"> Labor: intensive Capital: not intensive
Yield	<ul style="list-style-type: none"> Crop productivity: high Livestock productivity: high 	<ul style="list-style-type: none"> Crop productivity: low Livestock productivity: low 	<ul style="list-style-type: none"> Crop productivity: high Livestock productivity: low 	<ul style="list-style-type: none"> Crop productivity: low Livestock productivity: low

Agricultural Practices and Regions

There are a variety of agricultural practice classifications, and the regions in which they occur are strongly influenced by level of development, climate, and the purpose of the product. American geographer Derwent Whittlesey identified the eleven main agricultural regions in 1936. The following chart summarizes the types of agriculture commonly found in each climate region.

AGRICULTURAL REGIONS		
Agricultural Practice	Climate	Locations
Pastoral Nomadism	Drylands	<ul style="list-style-type: none"> ▪ Southwest, Central, and East Asia ▪ North Africa
Shifting Cultivation	Tropical	<ul style="list-style-type: none"> ▪ Latin America ▪ Sub-Saharan Africa ▪ Southeast Asia
Plantation	Tropical/Sub-Tropical	<ul style="list-style-type: none"> ▪ Latin America ▪ Sub-Saharan Africa ▪ South and Southeast Asia
Mixed Crop and Livestock	Cold and Warm Mid-Latitude	<ul style="list-style-type: none"> ▪ Midwest United States and Canada ▪ Central Europe
Grain	Cold Mid-Latitude	<ul style="list-style-type: none"> ▪ North Central United States ▪ South Central Canada ▪ East Europe
Commercial Gardening	Warm Mid-Latitude	<ul style="list-style-type: none"> ▪ Southeast United States ▪ Southeast Australia
Dairy	Cold and Warm Mid-Latitude	<ul style="list-style-type: none"> ▪ Northeast United States ▪ Southeast Canada ▪ Northwest Europe
Mediterranean	Warm Mid-Latitude	<ul style="list-style-type: none"> ▪ Southern coast of Europe ▪ Northern coast of Africa ▪ Pacific coast of the United States
Livestock Ranching	Drylands	<ul style="list-style-type: none"> ▪ Western North America ▪ Southeast South America ▪ Central Asia ▪ Southern Africa
Intensive Subsistence	Warm Mid-Latitude	<ul style="list-style-type: none"> ▪ South, Southeast, and East Asia ▪ Near large populations

Pastoral Nomadism This type of subsistent extensive agriculture is practiced in arid and semi-arid climates throughout the world. Nomads rely on the animals for survival. Animals such as cattle, camels, reindeer, goats, yaks, sheep, and horses provide meat for food and hides for clothing and shelter. Pastoral nomads move their herds to different pastures within their territory and often trade meat for crops with nearby subsistence farmers. Nomads in different regions rely upon different animals, depending on their culture and the climate in which they live:

- In South Central Asia and East Africa, people rely on cattle because they adapt to the hot climate.
- In desert regions of the Middle East, people rely on camels because they can survive without water for long periods.
- In Siberia, people rely on reindeer because they thrive in cold weather.

Shifting Cultivation In this type of subsistent extensive farming, farmers grow crops on a piece of land for a year or two. When the soil loses fertility, they move to another field. Unlike crop rotation, in which farmers change the crops that are grown within a field, shifting cultivation involves using new fields.

A specific type of shifting cultivation used in tropical climate regions is known as slash-and-burn agriculture, or swidden agriculture, because farmers sometimes clear the land by burning vegetation. This process enriches nutrient-poor soil by adding nitrogen to it. On the cleared land, farmers plant and harvest crops for a few growing seasons until the soil becomes less fertile. Then, they move to another area of dense, wild vegetation and repeat the process.

Examples of shifting cultivation including growing rice in Southeast Asia, maize (corn) in South America, and millet and sorghum in Sub-Saharan Africa. Most families grow various food crops in one field for their own consumption. The community or village often owns the land used for shifting cultivation. As population increases and land becomes scarce, this practice is not sustainable.



Shifting cultivation practices are often not sustainable and have negative influences on land, including depletion of nutrients in the soil.

Plantation Agriculture Under colonialism, commercial agriculture often replaced subsistence farming. A **plantation** is a large commercial farm that specializes in one crop. Most plantations are found in the low latitudes with hot, humid climates and substantial rainfall. They are typically labor intensive and often exploit the low-wage labor available in nearby villages and towns.

To reduce the cost of moving bulky crops, some processing occurs near the plantation. The valuable portion of the crop is transported. Common plantation crops include coffee, cocoa, rubber, sugarcane, bananas, tobacco, tea, and cotton. As labor costs rise, plantations become more capital intensive.

Mixed Crop and Livestock Farming Large-scale mixed crop and livestock farming is an intensive commercial integrated system that demonstrates an interdependence between crops and animals. In some cases, one person owns the land on which the crops are grown and the cattle are raised. In other cases, the adjacent parcels of land are owned by different people—one raises crops and the other raises livestock. On these farms, the majority of the crops are grains that are eaten by the livestock—to fatten cattle for slaughter or to feed dairy cows. The animals' manure is, in turn, used to help fertilize the crops.

Mixed crop and livestock farming is common in developed regions, such as Canada, the Midwestern United States, and northern Europe, but it has diffused to parts of the developing world. U.S. farmers often grow corn and soybeans. These crops can be used as animal feed or made into various products.

Grain Farming In regions too dry for mixed crop agriculture, farmers often raise wheat. Consumed mostly by people, wheat is produced in the prairies and plains. China, India, Russia, and the United States are the world's top wheat producers. The type of wheat grown reflects the climate:

- *Spring wheat* is planted in early spring and harvested in early autumn. It is grown in colder regions such as Canada, Montana, and the Dakotas.
- *Winter wheat* is planted in the fall and harvested in early summer. It is grown in warmer regions such as Kansas, Oklahoma, and Europe.

Commercial Gardening Typical fruits and vegetables grown in the United States include lettuce, broccoli, apples, oranges, and tomatoes. Large-scale commercial vegetable gardens and fruit farms are found mostly in California, Arizona, and states of the Southeast. In the winter, the United States imports these types of products from Mexico and Chile. This type of intensive farming is also referred to as truck farming because the products were traditionally driven to local urban markets and sold. Today, however, most trucks are refrigerated which allows farmers to sell their products to distant markets.

The concept of small-scale market gardening is making a resurgence near cities with buy-local food movements. **Market gardening** is when fruits and vegetables are grown near an urban market and sold to local suppliers, stores, restaurants. Today's market gardening in the United States is intensive and usually requires capital investments of greenhouses and fertilizers.

Dairy Farming Traditionally, dairies were local farms that supplied products to customers in a small geographic area. This pattern still exists in many less-developed regions of the world. However, during later 20th century, improvements in refrigeration and transportation expanded the **milk shed**, the geographic distance that milk is delivered. Large corporate dairy operations replaced smaller family-owned farms, which resulted in fewer farms but more

production. Most commercial dairy farms in the United States, Canada, and other developed countries are near urban centers and transportation corridors.

In a few countries, such as Argentina and Brazil, demand for dairy products increased faster than the pressure for consolidation. With economic growth and higher incomes, the number of dairy farms increased.

Mediterranean Agriculture Mediterranean agriculture is practiced in regions with hot, dry summers, mild winters, narrow valleys, and often some irrigation. Some of these regions are southern Europe, northern Africa, southwestern Africa, southwestern Asia, southwestern Australia, California, and central Chile. Common crops grown in Mediterranean agriculture include figs, dates, olives, and grapes. Herders in these regions often practice **transhumance**, the seasonal herding of animals from higher elevations in the summer to lower elevations and valleys in the winter. (See Topic 2.11.) Goats and sheep are the principal livestock because of the region’s rugged terrain.

Livestock Ranching Livestock ranching is the commercial grazing of animals confined to a specific area. Similar to pastoral nomadism, livestock ranching is found in areas that are too dry to grow crops in large quantities. Ranching is common in the western United States; the pampas of Argentina, Brazil, and Uruguay; parts of Spain and Portugal; China; and central Australia.

REFLECT ON THE ESSENTIAL QUESTION

Essential Question: *What is the connection between physical geography and agricultural practices?*

Elements That Influence Agriculture	Effects on Agriculture
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KEY TERMS

agriculture	extensive commercial	grain farming
climate	agriculture	commercial gardening
subsistence agriculture	capital	market gardening
commercial agriculture	extensive subsistent	dairy farming
intensive agriculture	agriculture	milk shed
extensive agriculture	pastoral nomadism	Mediterranean agriculture
intensive commercial	shifting cultivation	transhumance
agriculture	plantation	livestock ranching
intensive subsistent	mixed crop and livestock	
agriculture	farming	

Settlement Patterns and Survey Methods

Essential Question: What are rural settlement patterns and methods of surveying rural settlements?

The study of geography emphasizes a spatial perspective. Learning how people organized themselves spatially in the rural, or agricultural, environment has the same spatial perspective. Population density is less in rural regions compared to urban regions, but how and why humans interact with their environment in rural areas is just as significant. As technology has changed how people interact with the physical environment and the patterns of settlements.

Rural Settlement Patterns

Throughout history, rural residents commonly lived in **clustered**, or **nucleated settlements**. These settlements had groups of homes located near each other in a village and fostered a strong sense of place and often shared services, such as schools. Villagers raised crops and animals in the fields and pastures around their settlements. Soil types, climate, and labor force influenced the types of crops grown by residents of rural settlements and sold in local markets.

In contrast to many parts of the world, North American farmers usually created **dispersed settlements**, patterns in which farmers lived in homes spread throughout the countryside. In Canada and the United States, the governments promoted westward expansion by giving farmers land—usually 160 acres—if they agreed to reside on it for several years. Settlers moving westward also utilized the wide-open land to raise cattle. Fertile land in the expansive Ohio Valley allowed farmers to grow crops on large farms. As a result, most farmers in North America lived near their fields, and agricultural villages were rare.

Dispersed settlements do occur in other locations, particularly areas that have rugged or challenging environments, such as with limited water or poor soil. Dispersed settlements encourage individual self-sufficiency but make shared services such as schools or defense difficult.

Another rural settlement pattern is a **linear settlement**, in which buildings and human activities are organized close to a body of water or along a transportation route. Linear settlements along a river were common before industrialization because of the need for fresh water to irrigate crops. Today, the desire to be close to a transportation route is even more important. Small communities will sprawl along a railroad track or a metropolitan city will have multiple entry and exit points from an interstate highway.

RURAL SETTLEMENT PATTERNS



Agricultural Practices Impact Land-Use Patterns

Rural land use evolved as agricultural practices changed, often due to new technology. For example, Cyrus McCormick's invention of the mechanical reaper in 1831 reduced need for human labor since the machine cut and harvested crops. New technology made it easier for more agricultural products to be grown on more land with fewer laborers. Farming techniques, like crop rotation, also improved crop yields and produced a greater variety of foods.

Since new technology allowed more land to be farmed, changes in land ownership followed. The British enclosure movement divided up common land that had been shared by farmers into individual plots. Other European countries did the same, and farm size and production grew across the continent.

Rural land use was further altered by the Green Revolution (see Topic 5.5), which allowed agriculture to be practiced in regions of Mexico, India, and Indonesia, which were previously thought to be incapable of producing food. As agriculture became more commercialized, family farms struggled to compete with large corporate farms and many failed. Each of these changes impacted the size, scope, and organization of land-use patterns.



Source: goeograph.org.uk

Irregularly shaped plots of land created by the metes and bounds system in the United Kingdom.

Establishing Property Boundaries

In England, fields often had irregular shapes that reflected the location of physical features and traditional patterns of use. Plot boundaries were described using the **metes and bounds** system. Metes were used for short distances and often referred to features of specific points, such as “from the oak tree, 100 yards north, to the corner of the barn.” Bounds covered larger areas and were based on larger features, such as streams or roads.

The English colonists in America also used metes and bounds. However, beginning in 1785, the United States switched to a system based on surveying rather than landscape features. Surveying involves measuring and recording the distance, elevation, and size of features on the earth’s surface. The **Public Land Survey System**, or **township and range system**, created rectangular plots of consistent size. The government organized land into **townships**, areas six miles long and six miles wide. Each square mile, or **section**, consisted of 640 acres, and it could be divided into smaller lots, such as half sections or quarter sections. Because of this system, property boundaries in most of the land the west of the Appalachian Mountains often contain squares or rectangles.

French settlers in North America emphasized the value of access to a river for water and trade. So many farmers could have some river frontage, they developed the **French long-lot system**, in which farms were long, thin sections of land that ran perpendicular to a river. The best examples of this system in North America occur in Quebec and Louisiana.



A positive aspect of the long-lot system is that each landowner had access to water. What are some negative aspects of this system?

REFLECT ON THE ESSENTIAL QUESTION

Essential Question: *What are rural settlement patterns and methods of surveying rural settlements?*

Rural Land-Use Patterns	Rural Land Surveying Methods

KEY TERMS		
clustered (nucleated) settlements	metes and bounds	townships
dispersed settlements	Public Land Survey System (township and range system)	section
linear settlement		French long-lot system

Agricultural Origins and Diffusions

Essential Question: What are major centers of domestication of plants and animals and how have plants and animals diffused globally?

Until humans learned to produce a regular, predictable food source, searching for food consumed their time. But as people learned to grow crops, they eventually had time to develop new nonagricultural technologies. The development of agriculture was a gateway to other advances.

Centers of Plant and Animal Domestication

The **First (Neolithic) Agricultural Revolution** was the origin of farming. It was marked by the domestication of plants and animals. Much of the farming that took place during this time was subsistence farming, when farmers consumed the crops that they raised using simple tools and manual labor. The First Agricultural Revolution began in five centers, or hearths. The first hearths were in Southwest Asia, East Asia, South Asia, Africa, and the Americas.

Agricultural Hearths

In the mid-20th century, geographer Carl Sauer was among the first to argue that people in various times and locations developed agricultural hearths independently. He claimed the first hearths were in areas with high biodiversity on the edge of forests. Additional common characteristics of hearths include available fresh water, fertile soils, moderate climates, and skilled residents.

Before humans developed agriculture, they had existed as hunters and gatherers for tens of thousands of years. They lived in small, mobile groups—approximately 30 to 50 people—who could move easily in search of food. Larger groups would have surpassed the carrying capacity of their respective regions. People survived by living in low population density regions.

Animal Domestication Hunters in Central Asia were probably the first people to domesticate animals. They raised dogs and horses for protection, work, transportation, or as a food source. Later, agriculturalists in Southwest Asia kept goats, pigs, sheep, and cattle. People then domesticated cats, horses, camels, donkeys, and llamas, among other animals.

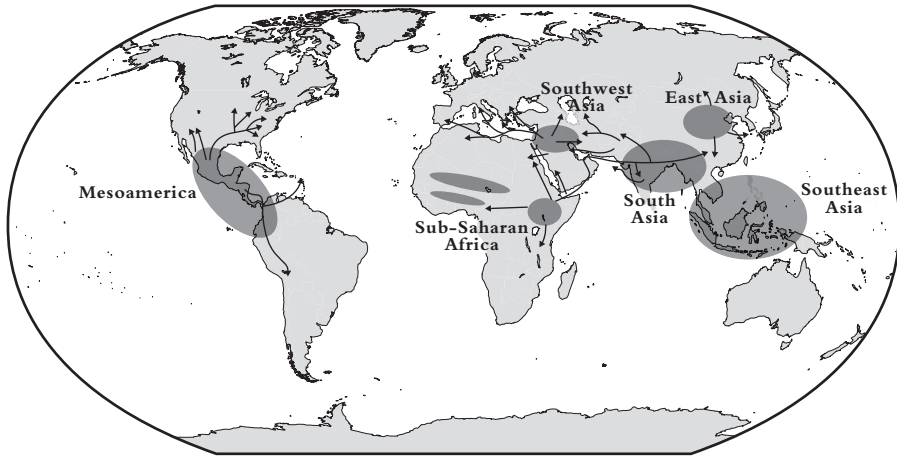
Plant Domestication Growing crops probably began after domestication of animals. People first used vegetative planting, or using parts of the stems or roots of existing plants to grow others. Planting seeds came later. Eventually, people in separate hearths began to trade of crops, animals, and innovations.

MAJOR HEARTHES OF CROP AGRICULTURE			
Time Period	Location	Crops	Early Diffusion Pattern
10,000 to 12,000 years ago	Southwest Asia (Fertile Crescent)	<ul style="list-style-type: none"> ▪ Barley ▪ Wheat ▪ Lentils ▪ Olives 	<ul style="list-style-type: none"> ▪ North Africa ▪ Southern Europe ▪ Central Asia
10,000 years ago	Southeast Asia	<ul style="list-style-type: none"> ▪ Mangos ▪ Taro ▪ Coconuts 	<ul style="list-style-type: none"> ▪ Southeastern Asia
9,500 to 7,500 years ago	South Asia (Indus Valley)	<ul style="list-style-type: none"> ▪ Barley ▪ Cotton ▪ Wheat ▪ Peas 	<ul style="list-style-type: none"> ▪ Indian subcontinent ▪ Southwest Asia
9,500 years ago	East Asia	<ul style="list-style-type: none"> ▪ Rice ▪ Soybeans ▪ Walnuts 	<ul style="list-style-type: none"> ▪ North Central Asia ▪ Korean peninsula
7,000 years ago	Sub-Saharan Africa	<ul style="list-style-type: none"> ▪ Yams ▪ Sorghum ▪ Cowpeas ▪ Coffee ▪ African rice 	<ul style="list-style-type: none"> ▪ Western Africa ▪ North Africa
5,500 years ago	Mesoamerica	<ul style="list-style-type: none"> ▪ Squash ▪ Peppers ▪ Maize (corn) ▪ Potatoes ▪ Cassava 	<ul style="list-style-type: none"> ▪ North America ▪ South America

The development of agriculture allowed people to live in permanent, higher-density communities. These communities were usually along rivers, which provided a source of water for people to drink. Rivers also provided a source of food (fish), a means of transportation for trade with other people, and, at times, defense from other groups.

But rivers such as the Nile, the Chang Jiang, and the Indus had another benefit. They flooded regularly, which spread nutrients across the land that contributed to soil fertility. Since this made agriculture more productive, farmers could support denser settlements, and it freed more people to specialize in tasks other than growing food. People could dedicate themselves to building stronger structures in which to live and store products, providing protection from predators and enemies (military), and developing new ideas and products. Increases in agricultural productivity spurred creativity and advances in all areas of human life.

THE FIRST AGRICULTURAL HEARTHTHS



Diffusion of the First Agricultural Revolution

The first major hearth of agriculture is the **Fertile Crescent** in Southwest Asia. The area extends from the eastern coast of the Mediterranean Sea and continues in an arc along the Tigris and Euphrates rivers to the Persian Gulf. Other major hearths existed along large river valleys such as the Chang Jiang (Yangtze) and Huang He (Yellow) valleys in East Asia, the Ganges valley in South Asia, and the Nile valley in northeastern Africa. In each location, people raised a variety of domesticated crops and animals.

In some cases, crops and animals were domesticated in multiple regions with seemingly no interaction among the people. This is called an **independent innovation**. For example, wheat was domesticated independently in Southwest Asia, East Asia, and South Asia. Pigs were domesticated in Southwest Asia, Southeast Asia, and South Asia.

Unique to the hearth of the Americas was the domestication of maize (corn), sweet and white potatoes, and tomatoes. Through diffusion, these products are now important parts of diets throughout most of the world.

Impacts of Hearths and Agriculture

The major hearths of agriculture led to the first urban centers. These first settlements grew into the first civilizations—large societies with cities and powerful states. Civilization brought increased trade, larger empires, and conquest. As societies continued to develop, people had time to specialize in their work and develop new occupations and technologies. This led to the advent of full-time metalworkers, artists, soldiers, weavers, and other specialized jobs.

Over thousands of years, agriculture spread widely and led to increased trade. The diffusion paths in the ancient world were expansive considering the transportation technology of the time. For example, the Roman Empire, which reached its geographic peak around 200 C.E., carried on extensive trade in

wheat and other agricultural products with present-day England, Africa, and Southwest Asia. On the Silk Roads, the land and sea routes connecting East Asia to the Middle East and Rome, people traded silk, rice, and other goods.

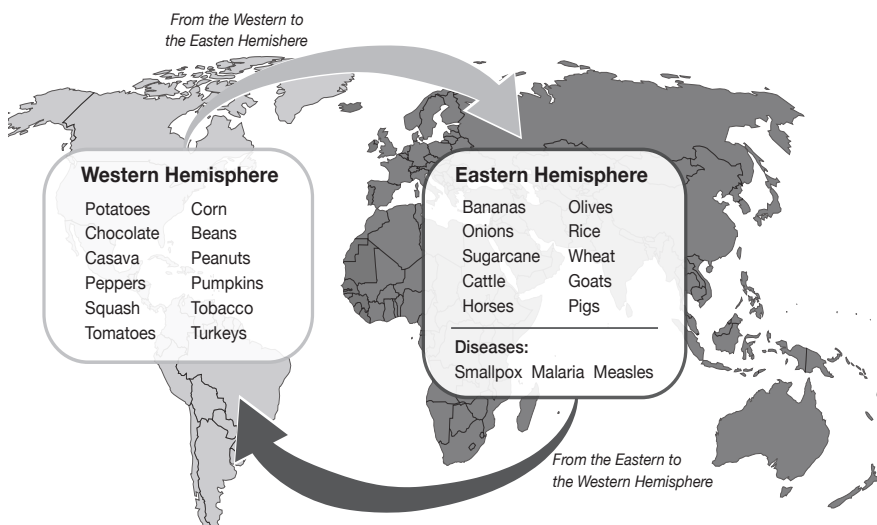
The Columbian Exchange

One of the most dramatic shifts in agriculture came after the voyage of Christopher Columbus in 1492. The **Columbian Exchange** was the global movement of plants and animals between Afro-Eurasia and the Americas. Europeans brought hundreds of plants and animals west across the Atlantic Ocean to the Americas and took hundreds of plants and animals back east. Crops such as coffee (originally from eastern Africa) and bananas and sugarcane (originally from New Guinea) continue to thrive today in the tropical climates of the Americas. Temperate climate crops such as potatoes (originally from northwest South America) and maize (originally from southern Mexico) are still extensively grown in Europe, Asia, Africa, and the Americas.

Domesticated animals from the Eastern Hemisphere, such as cattle, goats, and horses, were also brought to the Western Hemisphere. The turkey was originally found in the Americas and taken by Europeans back to their respective countries.

In addition to the agricultural exchange, there were many diseases that were also diffused across the Atlantic Ocean to the Americas, including smallpox, influenza, malaria, and measles. All of these had a devastating impact on indigenous populations. Tens of millions of people died, with the total population decreasing as much as 90 percent within a few generations of contact with European diseases.

COLUMBIAN EXCHANGE



Modern Diffusion

Diffusion of agricultural products, techniques, and technologies continued as civilizations became more advanced. The impact of the Industrial Revolution, which started in Great Britain in the mid-18th century, marked the Second Agricultural Revolution. (See Topic 5.4.) New machines, coupled with scientific discoveries to better preserve food, increased the food supply exponentially. Industrialization diffused across Europe about the same time as it reached the Americas, and ever since, most of Europe, the United States, and Canada have continued to be global leaders in food production and distribution.

By the mid-20th century, Green Revolution (see Topic 5.5) scientists created new crossbred or hybrid seedlings in a laboratory. These seedlings are used in more climatically restrictive regions and allowed people to produce food for themselves. This has helped to support growing populations in the semiperiphery countries of Mexico, India, and Indonesia.

REFLECT ON THE ESSENTIAL QUESTION

Essential Question: *What are major centers of domestication of plants and animals and how have plants and animals diffused globally?*

Agricultural Hearths	Diffusion Patterns from Hearth

KEY TERMS

First (Neolithic) Agricultural Revolution	Fertile Crescent
animal domestication	independent innovation
plant domestication	Columbian Exchange



GEOGRAPHIC PERSPECTIVES: *DIFFUSION OF GOODS*

A modern diet is often rich in food from around the world. Geographers have traced the diffusion of these crops from their hearths and the networks created through trade.

Crops and Locations

Florida oranges, Irish potatoes, Colombian coffee, Swiss chocolate, and Italian tomato sauces are closely associated with specific geographic locations. But each of these items originated in hearths distant from where they are produced today. Similarly, black pepper from India, cinnamon from Sri Lanka, and nutmeg from the Moluccas are among the many non-native luxuries that diffused to the European mainland. The goal of reducing the friction of distance between Europe and these faraway lands in order to improve the variety of peoples' diets was a significant factor in the diffusion of crops from one location to another.

Rate of Adoption

But people are creatures of habit, so it can take centuries for the new crops to be accepted by another culture. For example, when Europeans brought tomatoes from the Americas back to Europe, they became popular in Italy—but only for ornamental purposes. Initially believed to be poisonous, tomatoes did not find their way into conventional Italian cuisine until the 19th century.

Impact of Land and Climate

Successful diffusion depends on more than what people want. Crops are notoriously fickle with respect to the conditions in which they grow best. A slight change in soil conditions, average temperature, growing season, moisture, and latitudinal position can severely hinder the production of a crop.

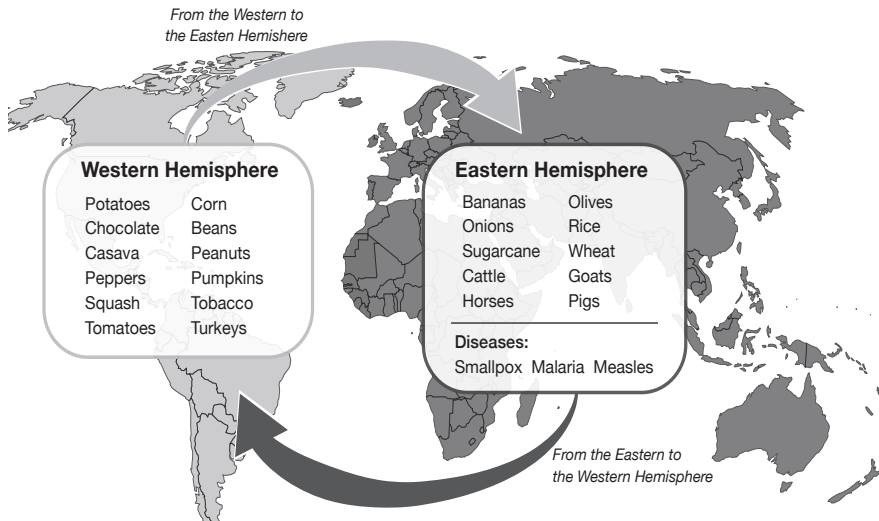
For instance, natural latex, extracted from rubber trees originating in South America, was first introduced to France in the 18th century. French and British companies then started to plant rubber trees in their colonies in South and Southeast Asia. Today, over 90 percent of its production is concentrated in Southeast Asian countries such as Thailand, Indonesia, and Malaysia. This primarily has to do with the availability of abundant low-paid labor in those regions, as opposed to the Americas. However, this has occurred only because both regions' distances from the equator and relative climates are very similar.

1. Describe a benefit of having access to food from a variety of places around the world.
2. Describe a cultural or social reason why the adoption of food from another location is a slow process.
3. Describe an environmental barrier that slows the spread of new crops growing in different regions.



THINK AS A GEOGRAPHER: ANALYZING RURAL NETWORKS

Global trade has been significantly different ever since Columbus sailed across the Atlantic Ocean in search of India. Even though he did not achieve his goal, lives were changed forever because of the migrations of people, the diffusion of ideas, the introduction of new foods, and the spread of diseases.



1. Define the Columbian Exchange.
2. Explain ONE positive and ONE negative social consequence of the Columbian Exchange on the Americas.
3. Using the graphic, explain the degree to which you have benefited from the diffusion of foods from Afro-Eurasia to the Americas.
4. Using the graphic, explain to what extent the Columbian Exchange changed the way human beings eat.

CHAPTER 11 REVIEW:

Origins, Patterns, and Settlements of Agriculture

Topics 5.1–5.3

MULTIPLE-CHOICE QUESTIONS

1. As a result of the Columbian Exchange, which crop was transferred from the Americas to Europe and later spread through the world?
 - (A) Coffee
 - (B) Maize (corn)
 - (C) Rice
 - (D) Olives
 - (E) Wheat
2. An agricultural hearth is a location where
 - (A) linear settlements are commonly found
 - (B) the Second Agricultural Revolution began
 - (C) widespread terracing is used
 - (D) plants and animals were first domesticated
 - (E) where the Third Agricultural Revolution failed
3. In which state or province is the long-lot land division most common?
 - (A) Montana
 - (B) Quebec
 - (C) Texas
 - (D) Iowa
 - (E) British Columbia
4. Mediterranean agricultural products are most commonly grown in
 - (A) Southern Spain and California
 - (B) the American Midwest and the European Highlands
 - (C) Northern Italy and the Nordic countries
 - (D) Australia and Central Asia
 - (E) the Middle East and the Andean Highlands

5. A meal that includes olives, pita bread, cheese, figs, lamb, and wine is most associated with which of the following?
- (A) Mexico
 - (B) United Kingdom
 - (C) Greece
 - (D) China
 - (E) Russia

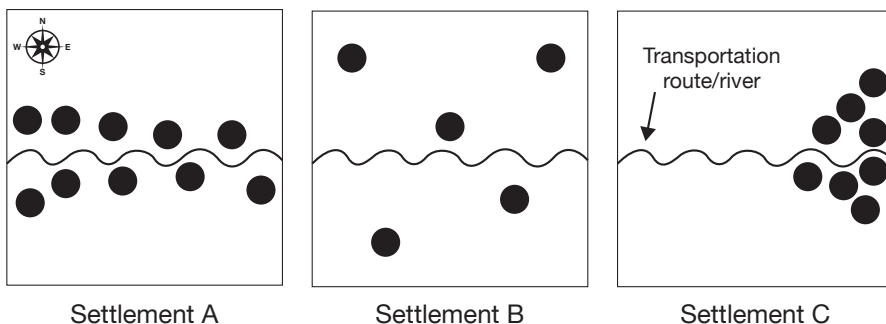
Question 6 refers to the following image.



6. Using the image above, which of the following is the most important identifier of the Public Land Survey System?
- (A) Circular fields
 - (B) Alternating crops shown with different colors in the fields
 - (C) Storage structures shown in the top half of image
 - (D) Square and rectangular fields
 - (E) Darker fields showing the flow of water
7. Rice and beans are very common ingredients used in Latin American food today. Which of the following scenarios best explains this?
- (A) Beans diffused from Europe and were added to meals using rice
 - (B) Rice and beans diffused from Europe and added to the diets of local people in the Americas
 - (C) Rice and beans are indigenous foods of the Americas
 - (D) Rice diffused from China and beans from Spain
 - (E) Rice diffused from Europe and was added to meals using beans.

FREE-RESPONSE QUESTION

Different types of rural settlement patterns developed for specific reasons.



- (A) Identify the type of rural settlement of A, B, and C.
- (B) Describe ONE reason why people settled in permanent rural settlements.
- (C) Explain ONE economic reason why people would settle in a pattern that reflects Settlement A.
- (D) Describe ONE environmental reason for the settlement pattern on Settlement C.
- (E) Using ONE world region explain how technology encouraged the settlement pattern such as in Settlement B.
- (F) Explain ONE negative social aspect of the settlement pattern in Settlement B.
- (G) Describe ONE limitation of analyzing settlement patterns by using a hypothetical diagram.