Origins of Agriculture

Agriculture is deliberate modification of Earth's surface through cultivation of plants and rearing of animals to obtain sustenance or economic gain. Agriculture originated when humans domesticated plants and animals for their use. The word *cultivate* means "to care for," and a **crop** is any plant cultivated by people.

Hunters and Gatherers

Before the invention of agriculture, all humans probably obtained the food they needed for survival through hunting for animals, fishing, or gathering plants (including berries, nuts, fruits, and roots). Hunters and gatherers lived in small groups, of usually fewer than 50 persons, because a larger number would quickly exhaust the available resources within walking distance (Figure 10-1). The men hunted game or fished, and the women collected berries, nuts, and roots. This division of labor sounds like a stereotype but is based on evidence from archaeology and anthropology. They collected food often, perhaps daily. The food search might take only a short time or much of the day, depending on local conditions.

The group traveled frequently, establishing new home bases or camps. The direction and frequency of migration depended on the movement of game and the seasonal growth of plants at various locations. We can assume that groups communicated with each other concerning hunting rights, intermarriage, and other specific subjects. For the most part, they kept the peace by steering clear of each other's territory.

Today, perhaps a quarter-million people, or less than 0.005 percent of the world's population, still survive by hunting and gathering rather than by agriculture. Examples include the Spinifex (also known as Pila Nguru) people, who live in Australia's Great Victorian Desert; the Sentinelese people, who live in India's Andaman Islands; and the Bushmen, who live in Botswana and Namibia. Contemporary hunting and gathering societies are isolated groups living on the periphery of world settlement, but they provide insight into human customs that prevailed in prehistoric times, before the invention of agriculture.

Invention of Agriculture

Why did most nomadic groups convert from hunting, gathering, and fishing to agriculture? Geographers and other scientists agree that agriculture originated in multiple hearths around the world. They do not agree on when agriculture originated and diffused, or why.

Southwest Asia was an early center of crop domestication (Figure 10-2). The earliest crops domesticated in Southwest Asia are thought to have been barley and wheat, around 10,000 years ago. Lentil and olive were also early domestications in Southwest Asia. From this hearth, cultivation diffused west to Europe and east to Central Asia. Rice is now thought to have been domesticated in East Asia more than 10,000 years ago, along the Yangtze River in eastern China. Millet was cultivated at an early date along the Yellow River. Sorghum was domesticated in central Africa around 8,000 years ago. Yams may have been domesticated even earlier. Millet and rice may have been domesticated in sub-Saharan Africa independently of the hearth in East Asia. From central Africa, domestication of crops probably diffused further south in Africa.

FIGURE 10-1 Hunting and gathering. Botswana Bushmen dig up wild onions called kjon.

In Latin America, two important hearths of crop domestication are thought to have emerged in Mexico and Peru around 4,000 to 5,000 years ago. Mexico is considered a hearth for beans and cotton, and Peru for potato. Squashes may have been first domesticated in a third hearth in the Americas, in southeastern present-day United States, as well as in Mexico. The most important contribution of the Americas to crop domestication, maize (corn), may have emerged in the two hearths independently around the same time. From these two hearths, cultivation of maize and other crops diffused northward into North America and southward into tropical South America.

Animals were also domesticated in multiple hearths at various dates. Southwest Asia is thought to have been the hearth for the domestication of the largest number of animals that would prove to be most important for agriculture, including cattle, goats, pigs, and sheep, between 8,000 and 9,000 years ago (Figure 10-3). Domestication of the dog is thought to date from around 12,000 years ago, also in Southwest Asia. The horse is considered to have been domesticated in Central Asia; diffusion of the domesticated horse is thought to be associated with the diffusion of the Indo-European language, as discussed in Chapter 5.

Inhabitants of Southwest Asia may have been the first to integrate cultivation of crops with domestication of herd animals such as cattle, sheep, and goats. These animals were used to prepare the land before planting seeds and, in turn, were fed part of the harvested crop. Other animal products, such as milk, meat, and skins, may have been exploited at a later date. This integration of plants and animals is a fundamental element of modern agriculture.

Scientists do not agree on whether agriculture originated primarily because of environmental factors or cultural factors. Probably a combination of both factors contributed. Those favoring environmental reasons point to the coinciding of the first domestication of crops and animals with climate change

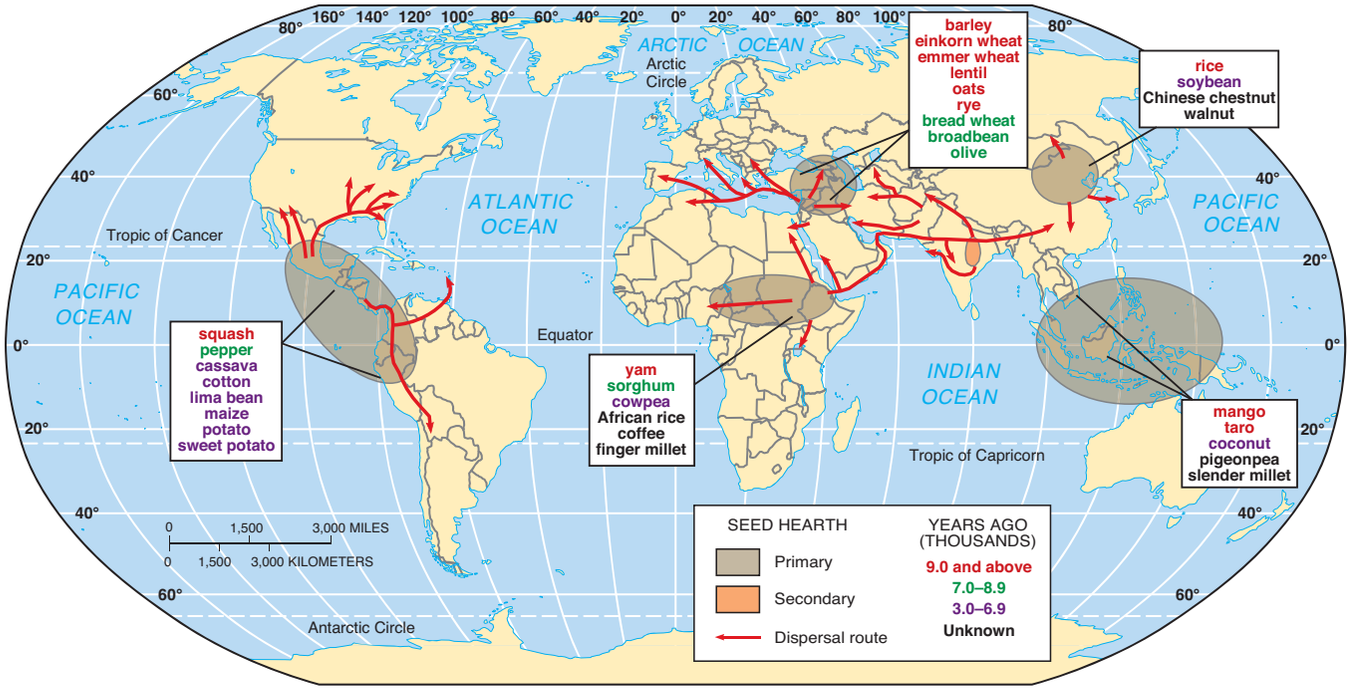

FIGURE 10-2 Crop hearths. Agriculture originated in multiple hearths. Domestication of some crops can be dated back more than 10,000 years.

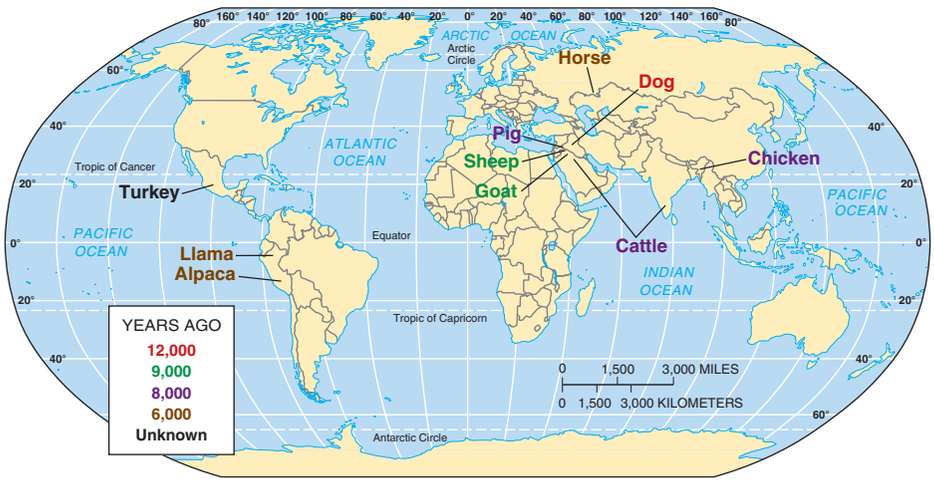

FIGURE 10-3 Animal hearths. Animal domestication also originated in multiple hearths.

around 10,000 years ago. This marked the end of the last ice age, when permanent ice cover receded from Earth's midlatitudes to polar regions, resulting in a massive redistribution of humans, other animals, and plants at that time. Alternatively, human behavior may be primarily responsible for the origin of agriculture. A preference for living in a fixed place rather than as nomads may have led hunters and gatherers to build permanent settlements and to store surplus vegetation there.

In gathering wild vegetation, people inevitably cut plants and dropped berries, fruits, and seeds. These hunters probably observed that, over time, damaged or discarded food produced new plants. They may have deliberately cut plants or dropped berries on the ground to see if they would produce new plants. Subsequent generations learned to pour water over the site and to introduce manure and other soil improvements. Over thousands of years, plant cultivation apparently evolved from a combination of accident and deliberate experiment.

That agriculture had multiple origins means that, from earliest times, people have produced food in distinctive ways in different regions. This diversity derives from a unique legacy of wild plants, climatic conditions, and cultural preferences in each region. Improved communications in recent centuries have encouraged the diffusion of some plants to varied locations around the world. Many plants and animals thrive across a wide portion of Earth's surface, not just in their place of original domestication. Only after 1500, for example, were wheat, oats, and barley introduced to the Western Hemisphere and maize to the Eastern Hemisphere.

Subsistence and Commercial Agriculture

The most fundamental differences in agricultural practices are between those in LDCs and those in MDCs. Farmers in LDCs generally practice subsistence agriculture, whereas farmers in MDCs practice commercial agriculture. **Subsistence agriculture**,