History

agriculture in ancient Egypt

Thousands of years ago, before the existence of Egyptian civilization, the regions of North Africa that surround the Nile River were fertile grasslands and woodlands, providing farmland and grazing land for communities of people. Historians estimate that around 3500 BCE, however, the environment in these grasslands began to change dramatically, perhaps because of overgrazing of the land, and eventually the region turned into desert, primarily the Sahara. Looking for a place where they could grow crops and keep herds of farm animals, people migrated into the area around the Nile River, forming small settlements beginning in about 3000 BCE. Because Egypt then and now has almost no rainfall, the Nile, which flows northward from Lake Victoria in Uganda, became the central feature of Egyptian agriculture, as well as of the Egyptians' cultural and religious life.

The region's very earliest settlers relied primarily on hunting, fishing, and foraging. They produced food, including limited crops, only for personal consumption. They were unable to store food, so food production was limited by the seasons. The development of more organized agriculture in many senses led to the rise of Egypt as a nation, for it was only through the agricultural surpluses that farmers produced that Egypt was able to take part in trade and support a class of rulers, soldiers, scholars, civil servants, and others who made the existence of the state possible. Further, by growing crops that could be stored, the Egyptians could maintain a steady supply of food throughout the year. This enabled the population of ancient Egypt to expand dramatically, because famine became far less common. Without the Nile River, the world's longest river at 4,037 miles, ancient Egypt could not have existed as a nation.

The Floodplain

The Nile River was surrounded by a fertile strip of land that provided the ancient Egyptians with most of their material needs. Immediately adjacent to the banks of the river was the floodplain. Each year, this land flooded with rising waters from the Nile, which was fed by water from monsoon rains in Ethiopia, far to the south. In an average year, the water would rise about 27 feet during a period called akhet, or the inundation, which ran roughly from July to December, with the flooding reaching its peak in late September and then beginning to recede in October. During this period, the land was flooded, and farm animals were moved to higher ground. The flood waters provided not only moisture for growing crops but also large amounts of fertile silt—that is, tiny particles of soil that were carried and left behind by the water when it receded. This silt was rich in nutrients, and it was in the waterlogged silt that the Egyptians planted their crops. The soil was so rich that it was black, causing the area often to be referred to as the Black Land.

In addition to the floodplain were higher elevations around the river. These areas of low desert did not become flooded, so they were not used extensively for crops. They were used primarily for hunting and burial of the dead. At still higher elevations away from the river were sparsely inhabited desert regions. In these areas, dates and grapes were cultivated. Traveling caravans passed through the desert, and the dates and grapes were often picked up and used to trade with other regions in North Africa and beyond. Water for these crops had to be laboriously transported from the river.

Water Management

Growing crops in the floodplain was not simply a matter of allowing the water to recede and then sowing seed. The ancient Egyptians relied on a complex system of locks and dams to control, contain, store, and distribute the water. They built dams at right angles to the water's flow, forcing the water into large basins that covered some 1,000 to 4,200 acres of ground. These basins were lined with clay to prevent the water from seeping into the ground. The water in the basins was then diverted by a system of dikes into canals, where it flowed where it was needed. Keeping this system of dikes and canals in working order was an ongoing task. Each year every Egyptian (and most took part in agriculture) had to move on average about 23 cubic yards of soil to keep the canals and dikes working properly.

Overall, about 5 million to 8.4 million acres were flooded in this way. Construction of these dams, dikes, and basins occurred over a thousand years, so that by about 2000 BCE, the entire region bordering both sides of the Nile each year became a
checkerboard of flooded basins during the high-water season and beyond. Water was regarded as property held in common, so the basins were also connected by sluices (canals with gates) so that it could be drawn for use upstream whenever there was not enough water downstream.

On average, the river rose 27 feet during the flood season. In some years, though, the river's rise would be less, sharply reducing the amount of water and silt and therefore the area available for crop cultivation. In these years, famine could result. On the other hand, in some years the water rose higher than 27 feet. The result was chaos, as people and farm animals could lose their lives as they scrambled to find higher ground. In modern times, the floodwaters of the Nile are controlled by the Aswān Dam. Construction of the dam was begun in 1902 and completed in 1988.

**Planting**

Planting usually began in December, after the waters had receded enough for work to begin. This period of receding waters was called proyet or peret, meaning "the emergence," when the ground emerged from the water. The period December through March was the coolest season of the year. It was during this time that crops germinated and grew (unlike many other regions of the world, where crops are grown during the warmest months).

Unlike the soil in such places as the American Midwest, which has to be turned over with heavy plows, the light alluvial silt in which the ancient Egyptians planted their crops had only to be broken up on the surface. (Alluvial describes deposits of soil on a floodplain or anywhere it collects next to a body of water.) For this purpose the Egyptians used plows that were light in weight and connected to the horns of oxen or even cattle. These draft animals were driven by a person, often children, with a stick. The plows were generally made of wood, although some had bronze blades. Sometimes draft animals were not available, so people pulled the plows or used short-handled wooden hoes to break up the surface of the soil; these hoes were so short that the work was backbreaking.

One important tool was the *shaduf* (also spelled shadouf or shadoof). This was a tool for irrigation that was originally developed by the ancient Sumerians. It was made of a long branch or pole on an upright frame. At the long end of the pole hung a skin bag, a bucket, or even a reed basket coated so that it would hold water. At the short end of the pole was a weight, typically a stone. This weight served as a counterweight to the bucket when it was filled with water. The operator lowered the bucket into the water and then easily raised it out with the help of the counterweight. He then swung the pole to carry the water to where it was needed, often an irrigation canal. Thus, the floodwaters continued to irrigate crops even after the river receded. Estimates are that a farmer could move about 660 gallons of water each day with the *shaduf*.

The planting of crops at this point was relatively easy. The farmer simply walked over the ground with a bag of seed, sowing the seed as he walked. Frequently, the farmer would then drive a herd of goats, cattle, or sheep over the ground. In this way the seed was pressed into the soil so that birds were not able to eat it. The ancient Egyptians grew a variety of crops in this way. The most common crops were grains. (In many older texts, readers are likely to find the word *corn* used to refer to these grain crops. To Americans, *corn* refers to the yellow vegetable found on cobs, but in earlier eras it was a general word for *grain.*) One was emmer wheat, though the Egyptians stopped growing this crop after the Romans took over the area. Other varieties of wheat were grown as well. Barley was grown for use in beer and in baking, though this crop became less important after the Romans invaded and replaced beer with wine as the favored beverage.

Other crops included flax, used to make ropes and cloth; papyrus reed, used to make such products as boats, paper, rope, sandals, and various household goods such as mats; and the castor oil plant, from which oil was pressed. Also grown were vegetables, though typically in smaller plots for consumption by the farmer and his family. Fruits included melons, pomegranates, dates, figs, and grapes. An enormous number of bees provided honey used in desserts.

In addition to crops, the ancient Egyptians relied on livestock for food. Some of this livestock, including oxen and donkeys, was used to help with the work of plowing and harvesting. Later, around 1600 BCE, camels and horses were imported from Asia for similar purposes; camels were unknown in Egypt during the time of the pharaohs. Otherwise, the Egyptians also kept sheep, pigs, goats, ducks, and cattle for consumption as well as for hides and milk. Dried animal dung was put to use in cooking fires.

**Harvesting**
The dry season began in March and continued to July. This period was called shemu (also shomu), meaning "the drought." Harvesting usually occurred in May or June and sometimes in April, before the next flood began. Grains were harvested using sickles made of wood that was cut and glazed to form a sharp edge; by Roman times sickles made of iron were becoming more common.

Large estates made use of traveling harvest teams, who began their work early in the season and followed the maturing of crops downriver as the season progressed. (The Nile flows north into the Mediterranean Sea, so downriver means in a northerly direction and upriver refers to a southerly direction.) Because harvesting involved a great deal of work in a relatively short period of time, nearly everyone participated. Livestock was then allowed to graze in the fields to eat the stalks left behind. Also, poor people often followed harvesters, hoping they could scavenge some bits of grain for themselves.

After the grain was cut with sickles, it had to be bundled. Sometimes the bundles were loaded onto the backs of donkeys, but often they were carried in sacks suspended from poles, each pole carried by two men. The grain was then taken to a dry place to undergo a process called parching, or drying out the grain so that it did not later get moldy or rot. There, the threshing process would begin. Workers spread the grain, still on its grassy stems, in a fenced or otherwise contained place where the ground was packed hard and first carefully cleaned. Donkeys then trampled it. In some places cows performed this job. This trampling helped separate the grain from the chaff, or the seed coverings and other debris that is not eaten.

During the next step in the harvesting process, called winnowing, workers used large forks, like pitchforks, to scoop up the straw, leaving behind mostly grain. The straw was kept for use in the production of mud bricks, which were strengthened by the inclusion of the straw. Using sieves made of palm leaves and reeds, workers—usually women at this stage—sifted the materials to further separate the grains from the remaining smaller bits of chaff. Finally, the grain was ready to be stored in granaries for later consumption.

The fields of ancient Egypt were highly productive, particularly considering that crops were grown without benefit of modern tools or fertilizers. Records show that at that time an acre of land could yield nearly 4,200 pounds. Total production could range as high as 2.8 million tons, though 2.5 million tons was the production for a typical good year. This amount of grain fed a population during the New Kingdom (1550–1070 BCE) that has been variously estimated from as few as 2 million to as many as 5 million people. During bad harvest years, production fell to as low as about 1.5 million tons.

One period of dryness demonstrates the vital importance of the Nile and its annual flooding in the life of the ancient Egyptians. Late in the third millennium BCE, Egypt suffered a period of great political instability. The royal families were feuding, and questions arose about the proper succession of kings. Then, around 2134 BCE, the Eighth Dynasty fell. In the resulting power vacuum, local nobles seized control of the land in their areas and gained command of portions of the king's army. Although in theory Egypt retained a ruling monarch, in practice these nobles ruled Egypt, often causing suffering among their people. Much of this instability came about because of a long period of dryness. The people were starving, and in response many became violent. Peasants revolted and seized property from landowners, turning them into servants. Order was restored to the country beginning in about 1900 BCE, when Amenemhet I took power and began a new dynasty. It is likely that much of this instability would not have occurred had it not been for the famine caused by low flooding of the Nile.

Amenemhet and his followers believed that Egypt had suffered famine and instability because it had been abandoned by the gods. This abandonment was the result of the injustice and cruelty of previous dynasties. Amenemhet resolved to rule more justly. In particular, he acknowledged that common people and not just nobles could enjoy an afterlife and meet the god Osiris after they died.

Osiris

The ancient Egyptians did not see agriculture as merely a physical process. For them, agriculture was an expression of the will of the gods in their daily lives. One of these gods was Osiris, who represented a number of elements of Egyptian life, including the Underworld. Beyond that, Osiris was the god of vegetation and the earth. The year's dry period represented the death of Osiris, who was reborn when the Nile flooded and crops grew.

According to legend, Osiris was the son of Nut and Geb, Egypt's original king, and he took the throne when Geb gave it up. His brother was Seth, and his sister was Isis, to whom he was married. At the time he took the throne, Osiris saw that the land of
A major myth surrounds Osiris. According to ancient texts, Osiris traveled to other lands to bring them the benefits of civilization. While he was gone, his brother Seth plotted to take over the throne. He and a band of conspirators later murdered Osiris, placed his body in a coffin, and cast the coffin into the Nile. After much searching, Isis found the body, but Seth then tore the body into pieces. He scattered the pieces throughout Egypt, but Isis found them. After she reassembled them, Osiris was magically reborn and lived long enough to father a new king. After his death, he was king of the afterlife, where he admitted people to a fertile, green land.

In time, the life, death, and rebirth of Osiris became symbolic of the cycle of the seasons in Egypt. His death represented the receding of the Nile and the dry season; his rebirth represented the flooding and the growth of crops. This cycle of death and rebirth was also seen as symbolic of the sun, which daily "dies" and then is "reborn" the following day. Further, Osiris's battle with Seth came to be seen as symbolic of the eternal struggle between the green, fertile area around the Nile and the surrounding harsh deserts.

To celebrate Osiris, the Egyptians held annual festivals. A festival called the Fall of the Nile was a period of mourning; during this festival the Egyptians brought gifts to the banks of the Nile and expressed their grief. When the river flooded again, another festival to Osiris celebrated the event, commemorating Isis's location of his body. Shrines to Osiris were thrown into the river, and priests officiated at celebrations signifying that Osiris's body had been located again. The Egyptians also believed that Osiris entered a person's body when he or she ate the vegetables of his creation. Isis became a model of womanhood, who taught women to weave cloth and grind grain.

Administration

Agriculture in ancient Egypt was a highly organized activity. Most people were involved in agriculture in some way. Nobles and wealthy people often owned the land that was farmed and supervised the activities of farmers, who worked the land in exchange for shelter and food. Because land was owned privately (though, in theory, it was owned by the gods and therefore by the pharaoh as the gods' representative), some landowners became wealthier than others, and class divisions inevitably came about, sometimes leading to conflicts such as boundary disputes that had to be resolved. In other cases, people rented land from wealthy landowners, paying them with a percentage of their crops. The Egyptian government also enlisted people to work on the dikes, canals, and other components of the irrigation system. This work was in effect a type of tax called corvée, or unpaid labor exacted in place of taxes by a governmental authority, usually for public works.

The economic system of ancient Egypt was a command economy, that is, an economy controlled and directed by the state. The state employed a large class of scribes, surveyors, inspectors, and supervisors to manage agricultural activity. For example, keeping track of land boundaries was difficult, because the Nile River valley flooded each year, changing the contours of the land, so surveyors had to be employed each year to remeasure and mark out fields with stones. An oath had to be taken that the boundary was correct: "I swear by the great god that is in heaven that the right boundary stone has been set up."

Establishing boundaries was important, because the output of each field determined how much tax, in the form of a percentage of the crops, the landowner or farmer had to pay to the government. The amount of this tax varied, with higher taxes assessed on the most fertile land, a smaller amount on higher and less productive land, and a still smaller amount on the highest and least productive land. Generally, it is estimated that the tax amounted to about 10 percent of output, usually assessed as a number of bags per unit of land. The bureaucrats who measured and surveyed the fields also assessed the tax and were responsible for collecting the grain, storing it in local and regional granaries, and distributing it as needed throughout the year.

Ancient Egypt experienced dry periods, when the Nile did not rise as much as it did in other years and agricultural output was reduced. In general, though, the Nile Valley produced an abundance of food. This surplus enabled the state to support traders, merchants, craftsmen, civil servants, priests, an army, scribes, and others who contributed to the rise of Egyptian civilization. Without this surplus, people would have been limited to subsistence agriculture, or agriculture that provided just enough food for a family to stay alive. Further, the abundance of grain enabled ancient Egypt to engage in trade with neighboring regions. By trading its surplus of grain, the nation was able to acquire many commodities, including lumber, metals, precious and semiprecious stones, minerals, and the like.
The word \textit{agriculture} refers to the cultivation of major crops such as grains, usually grown in large fields and harvested a single time at the end of a growing season. In contrast, the word \textit{horticulture} is used to refer to the cultivation of flowers, fruits, vegetables, and ornamental plants, usually in smaller family plots of ground. Because these plots were not irrigated in the same way as the fields were in ancient Egypt, water typically had to be carried in by hand. Also, because the soil was poor without the silt carried by the flooding Nile, it had to be fertilized. Some families kept pigeons in cages and used the birds' droppings to fertilize their gardens.

The ancient Egyptians devoted considerable energy to horticulture. The earliest record of a private garden dates to 2200 BCE. The ground surrounding nearly every home had trees that were thought to be the dwelling places of spirits and gods. Additionally, the Egyptians cultivated flowerbeds; if space was limited, they grew flowers in pots or troughs. Flowers included poppies, cornflowers, irises, jasmine, chrysanthemums, ivy, mandrakes, mallows, lotus lilies, and larkspurs. Families grew fruit such as dates, as well as oil-bearing trees such as the baq, or horseradish tree. Grapes were a popular crop, used in making wine. Vegetables and herbs such as lettuce, cabbage, cucumbers, radishes, beans, leeks, garlic, dill, chickpeas, and lentils were routinely grown for family consumption. The flower gardens attracted bees, so honey was a staple in the ancient Egyptians' diet. Many gardens had ornamental ponds with fish.

The ancient Egyptians also made use of trees, shrubs, and other plants that grew wild. These plants were used to produce dyes as well as wickerwork, including sandals, mats, baskets, and similar items. In marshlands the Egyptians found papyrus used to make not only paper but also amulets thought to have magical powers. Bouquets of papyrus symbolized joy and victory.