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The beginnings of agriculture in Egypt: Transformations, adaptations, and ecological foundations

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Abstract

The development of agriculture in Egypt marked a fundamental transformation in human society, shifting from a hunter-gatherer existence to a settled agrarian lifestyle. This study explores the origins of Egyptian agriculture, examining its ecological, social, and technological foundations. The paper delves into the role of the Nile River in shaping early farming practices, the domestication of plants and animals, and the impact of climatic changes, particularly in the Sahel and Sahara regions. It also discusses the influence of pre-dynastic cultures, including Merimde, El Omari, and Badarian, in developing early agricultural techniques. By analysing archaeological evidence and historical accounts, this research highlights the long-term consequences of agriculture on Egyptian civilisation, from population growth to economic systems. The paper ultimately underscores how agricultural advancements sustained Egypt's prosperity and influenced its administrative, cultural, and political developments, making it one of history's earliest and most enduring civilisations.

Keywords: Ancient Egyptian agriculture; Nile River farming; Pre-Dynastic Egypt; Plant and animal domestication

1. Introduction

A drastic and fundamental shift occurred, expanding its growth about 12,000 years ago. This time phase or change in the way of life is referred to by many scholars as the Agricultural or Ecological Revolution. In this time frame for the beginning of agriculture and food production, we will talk about Egypt, where the great civilisation sprung up on the banks of the Nile River. While discussing the change in society, we generally talk about three main subtopics. –

- Revolt
- Transformation
- Revolution

This revolution led to a rapid increase in population, which led to more calories per unit of land production. The bonding relationship between human beings and nature continued to be static through the hundreds of thousands of years of hunting and gathering, but this would change with the Agricultural Revolution.

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Figure 1 A wall painting in the walls of the cave in the Tassili n' Ajjer in the area of modern Algeria depicting Agriculture and Domestication (Elizabeth Pollard, Clifford Rosenberg, Robert Tignor – 'Worlds Together Worlds Apart)

Sedentarism and settled agriculture mean applying human force and labour to an agreed and fixed plot of land. The people started to acquire a settled way of pastoralism, which complemented a settled farming environment. While talking about animal domestication, the dogs were first domesticated. Around the Zagros mountainous region in present-day Iraq in about 9000 BCE. Dogs received more comfort than humans.

1.1. Africa: A Race with Sahara

There are many pieces of evidence and discoveries to be made to prove the beginning of settled agriculture in various regions of Africa. According to many scholars, the Sahel region of Africa, spanning over an area in the southern Sahara Desert, where the residents changed their way of life from hunting and gathering to settled agriculture. As compared to the other regions of the world, the Sahel area was comparatively colder and moister in a time period of around 8000 BCE. Through the ages, with the expansion of the Sahara Desert in around 2000 BCE and the climate becoming warmer, the residents of this area eventually had to disperse and migrate to other parts of Africa by taking their skills. Being the world's largest river, the region of Egypt chiefly relies on the pulses of the Nile throughout the length and breadth of its civilisation. Unlike the features of the ancient Mesopotamian civilisation, Egypt doesn't possess a fertile hinterland. Rising from parts of Central Africa and Ethiopia, a portion of the Upper Nile cuts through the Sahara Desert. According to the famous historian of ancient Greece, Herodotus, "The soil of Nile which is rich in alluvium was formed by river sediment." There were early human settlements in Egypt at the beginning of the Early Dynastic period. (c. 3100 BCE), which is further equivalent to the Neolithic Period. The era of the Lower Palaeolithic Age started around a period of 30,000 BCE. During this period, it featured mobile building structures and a tool-making industry. The Mesolithic period in Egypt saw the emergence of notable cultures: Halfan, Qadan, Sebilian, and Harifian. Even the Neolithic Period is further divided into Merimde, El Omari, Maadi, Tasian, and Badarian cultures. The Qadan culture was different from that of the Khormusan culture, and it practised the system of wild grain harvesting along the fertile valley of the Nile.

Figure 2 Location Of Egypt in the Map of Africa

The predictable nature of the Nile endeared the source of life and abundance of the Egyptians, which later on further shaped their character and culture. According to Egyptian belief, they believed in keeping the parts of chaos personified only to the boundaries of the desert and its marauders, which would finally allow all that was good and right to occur. The wheat and barley crops were processed and gathered by the residents of Sebilian Culture. During the migration process, the residents of Harifian culture moved out of the Fayyum and the eastern desert area of Egypt to merge with the Pre-Pottery of the Neolithic Period B. Thus, it led to the creation of Circum Arabian Nomadic pastoralism, around a period of 6,000 BCE. Different Neolithic settlements sprung up in considerable numbers in this area, and residents were likely to be migrating and returning to this area from their previous residing place, the Fertile Crescent.

To understand the process of how the Egyptian agricultural system worked, one needs to gather all the information and study the unique features of the Nile Valley. (Hume in 1925, Said in 1962). If we study the Merimde culture, we could know that it developed and took its shape. The people of this culture usually focused on creating more simple pottery; they lived in small huts with thatched roofs and used stone tools. They led a sedentary way of life and practised domestication of cattle like sheep, goats, and pigs; they also laid their focus on plants like wheat, sorghum, and wheat. The El Omari Culture of around a time period of 4100–3100 BCE, was located near the area of modern-day Cairo. Moreover, people resided in the huts and possessed undecorated, misshaped pottery. The Maadi Culture, popularly known as the Buto Maadi was the most essential culture of the Lower Egyptian prehistoric culture. Copper was commonly used in this culture because it was readily available, and the pottery was basically simple and undecorated. The Tasian Culture of around 4500–3100 BCE manufactured red, brown, and black pottery known as blacktop ware. So, from this period onwards, the Lower Egyptian culture was highly influenced by Upper Egypt. The Badarian Culture, which originated around a period of 4500–3100 BCE, was similarly related to the Tasian culture. In comparison, the Badarian culture improved the use and manufacturing of blacktop ware and, in addition, used copper. The Amratian Culture, or the Naqada I culture, flourished in the 4000–3500 BCE and continued the use of blacktop ware and, in addition, white crossline ware, which featured pottery with closed parallel lines that were in white.

A topography that seemed to be a convex one has been thoroughly flourishing in the Nile, which created a paradigm for the floodwater to be quickly inundated into these basins annually. The following developments in modern times have totally obscured the basins; during the ancient pharaonic times, these formed a feature of a valley, varying in size from small ponds to large lakes of depths of 0.5–2 metres. (Hume in 1925, Hurst in 1952, Said in 1962). The annual phenomenon was highly fruitful and proved vital for Egypt's fertility. At the same time, flooding deposited 110 million tonnes of sediment washing down from the Ethiopian highlands. (Bowman and Rogan 1999). Consequently, it can be

seen that the remarkable consistency of the Nile floods has been providing the Ancient Egyptians with a wayward opportunity towards healthy agricultural production. (Willcocks and Crag in 1913, Hurst in 1952, Hurst et al. in 1963).

Being one of the first societies to attain a standardised civilisation and one of the first to start the development of cities, Egypt remained backward, rural, and agrarian. Through the writings of Adolf Erman, being one of the first societies to attain a standardised civilisation and start the development of cities, Egypt still remained backward, rural, and agrarian. Through the writings of Adolf Erman, "Agriculture is the foundation of Egyptian Civilization." Karl Butzer remarked with possibility and perception, "It has become difficult to ignore the possibility that the major components of Ancient Egyptian History may be unintelligible without a recourse towards an Ecological perspective." A rhetorical and comprehensive work and research had been published so far by Hurst in 1952 during a thorough discussion on the Nile Floods. His work was thoroughly analysed using the nilometer readings from 622–1522 A.D.

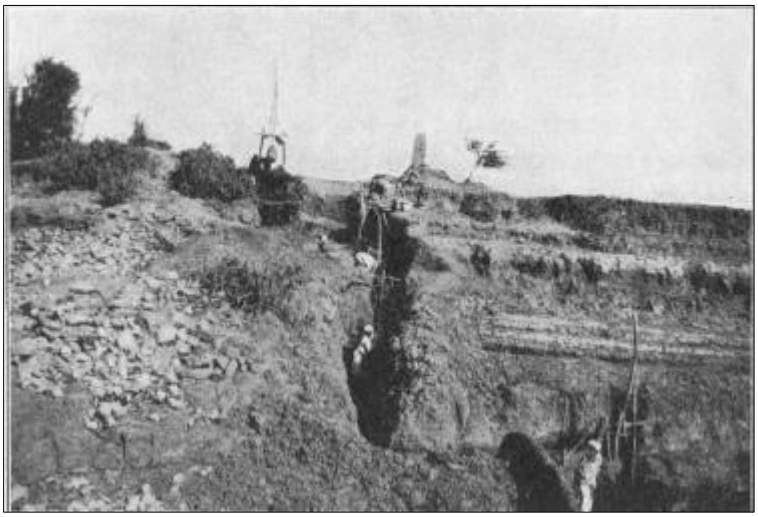

Figure 3 Shadufs near Kom Ombo

The soil of Egypt becomes rich in different important components and minerals; it provides a fruitful base for agriculture, and hence, the peasants don't have to work so hard to till the soil. Half of the work is fulfilled by the annual flooding of the Nile. So, the great Greek historian Herodotus was greatly inspired by the Nile River's work in agriculture; furthermore, he commented by describing Egypt as "The Gift of the Nile." There was a gradual shifting of the height of flood water in ancient times. During the period of the Middle Kingdom, there were excessive floods; during the First Intermediate Period, there was a frequently lower rate of floods; and during the pre-dynastic period, there was a declining rate of flood heights. Once the flood water receded and left the fields, no more water would be added until the next flood cycle. Thus, all crops were dependent on that single influx of moisture. (Beaumont in 1993).

1.2. Egyptian Farm and Agriculture

Many sources were to be highlighted while we discussed the ancient Egyptian farming technique or system. The inheritance of land always mattered a lot and played a substantively important role in its cultivation. Moreover, sometimes, this land was worked by the owner, and most of the time, outside labour was hired, or the land was leased or worked by the contracted labourers. According to some references of the Wilbour Papyrus, the field labourers held up some rights on the plots of land, even if it was rented for work or sold to another party. To what extent this practice was prevailing is questionable and debatable over the private government and temple lands. (Gardinjer in 1948, Menu in 1970 and 1982, Eyre in 1994, J Manning in 1999, Katary in 1999). Further, it was estimated that an individual labourer can cultivate up to 7.5 acres of land. (Jansen in 1986), (Here, one aroura = 52 x 52cm).

1.2.1. Palaeolithic, Mesolithic and Neolithic sites

Many archaeological sites are recorded to be found in Egypt. The Nile.

The valley and the vast desert of the Sahara are the two most important areas. The Nile seemed to be a permanent river system, and the residents tended to live in the fertile valley no matter how dry the adjacent desert of the Sahara was. The behaviour of the Nile changes according to the season, and it's primarily influenced by the headwaters' climate in the highlands of East Africa from where it's originating. Sometimes the amount of water in the Nile was less than its

regular level, and the water carried a heavy load of sediment, which got deposited on the flood plain and ultimately choked it to form silt.

Table 1 Palaeolithic and Mesolithic Archaeological Sites in Egypt

Archaeological Sites in Egypt	
Palaeolithic Age	Mesolithic Age
Sites of Bir Tarfawl and Bir Sahara East	Abydos
Nazlet Khater - 4 (in Upper Egypt)	Cemetery D at Abydos
E71K9, located in the upstream of the West bank of Esna(Isna)	Cemetery G at Abydos
Sites of Wadi Kubbaniya	Cemetery X at Abydos
6-B-36, located on the West Bank, almost the opposite side of Wadi Halfa	Abydos: Osisris Temenos
Jebel Sahaba, situated in the North of Wadi Halfa	Alawiyeh
Qadan in Lower Nubia	Fayum
Mechta El-Arbi	el Amrah

The Middle Palaeolithic Age revolves around a period more than 175,000 years old. Possibly, its age is considered to be more than 200,000 years ago. The era lasted approximately 45,000 years. Then, the Egyptian Middle Palaeolithic is further divided into Nubian Middle Stone Age, Mousterian, Aterian and Khormusan... The late era of the Acheulian period dates back around 500,000 years. Mainly, most of the sires of Lower Palaeolithic importance fall under this category. The Early Middle Palaeolithic Age is dated to be around 230,000 years ago. Since many Lower Palaeolithic tools are to be unearthed, they are to be seen flaked on both sides.

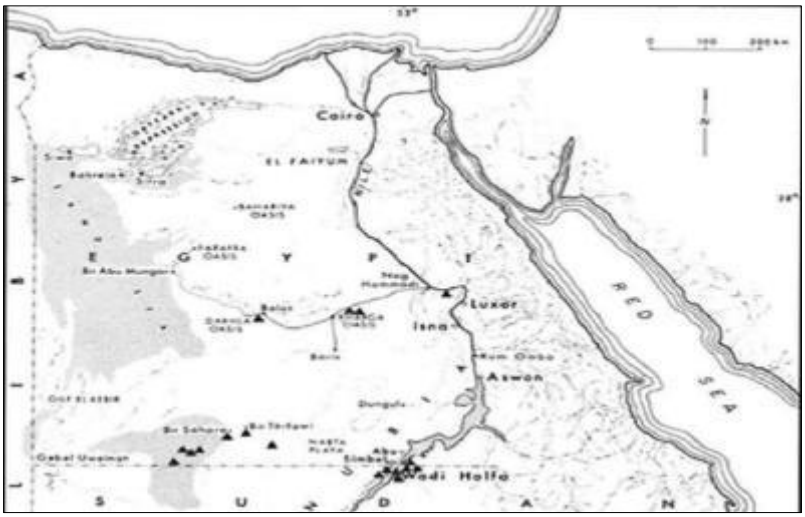

Figure 4 Locations of the Lower Palaeolithic Sites

According to some sources, one can assume that during the Saite Period, or probably during the period of the New Kingdom, during the harvesting season, the taxes were a pre-assured quantity and not a percentage of it. One khar of land, or moreover, about one-tenth of an average annual yield, was assessed for taxes, and usually, though not always, it was paid by the landowner and the payment dues. (Donker van Heel in 1998). The proceeds were split between the farmer and the lessor or the field owner. However, the cultivator still had to pay even if he and his family didn't work or contribute towards labour. After this, the lessor or the cultivator probably took home a quarter each or a third of an average crop. (Brewer et al. in 1994, Brewer and Teeter in 1999). Moreover, the ancient Egyptian farmers practised both extensive and intensive agriculture. For example, the cultivation of durum wheat, which was an intensive crop during the summers, was to be introduced during Graeco-Roman times. Barley was the dominant and most crucial grain

during the era of the Old and Middle Kingdoms. This is hence supported by the common phrase 'Barley and Emmer'. (Gardiner in 1941; Dixon in 1969, p - 132).

There were many words to describe and further depict the Egyptian grains. Among them, the word 'Ankhet', derived from the 'verb to live', deserves special mention. The production of the two crops, wheat and barley, was so popular that its production went beyond its sustenance. Throughout an overview of time, a close symbiosis rose between humans and plants, providing further nourishment to the animals and pollination in the plants; moreover, flowers dispersed their seeds and carried out their activities. We can compare these detentions to those of modern apes, gorillas, orangutans, and gibbons. In conclusion, the earlier hominids used to prefer ripe, often fermented fruits for about a million years.

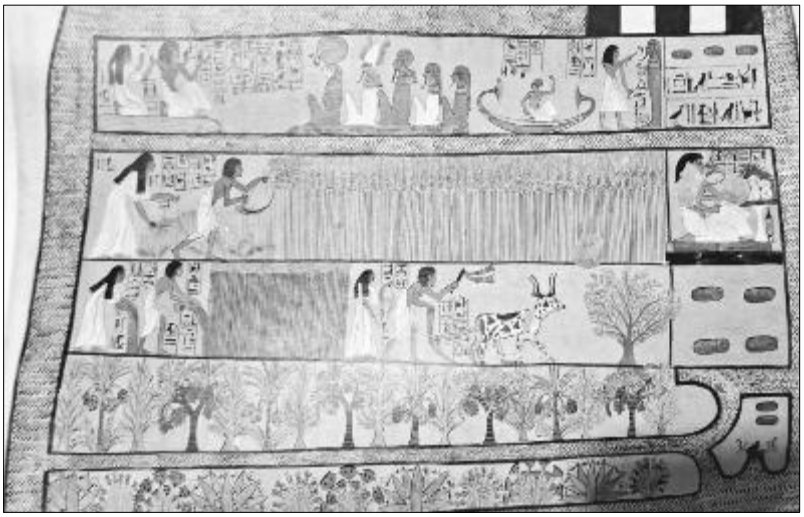

Figure 5 The process of harvesting grain and pulling ripened Flax during the 19th Dynasty

Tomb paintings and wall murals are depicting the process by which the crops were grown and harvested. During the ripening season, government officers would come for the setting of taxes, depending on the rate of production. During late April and May, sickles were used to harvest crops and carried to the threshing floor in the baskets.

The fresh heads of the new grains were separated from the chaffs by the winnowers with the help of the wooden scoops. The latest samples of the clean grains were inspected, and the rest were tallied and sent to the granary for division into shares. (National Geographic in 1978, Beaumont in 1993). In ancient Egyptian civilisation, beer was a nourishing grog with a variably small amount of alcohol. (Lucas in 1962, Brewer et al. in 1994). Lentils were considered an essential crop in Egyptian civilisation, complementary to wheat and barley crops. Lentils were grown and harvested in the eastern region, where they were transported. So, like wheat and barley, lentils were not an indigenous crop. (Zohary in 1972; Zohary along with Hopf in 1973 p - 132). One of the earliest specimens of lentils was unearthed from the Neolithic sites of Merimda and El Omari. Many specimens of lentils were further excavated underneath Djoser's or Zoser's Stepp Pyramid around C. 2680 B.C. (Lauer et al. in 1951 p - 132).

There is a large family of flowering plants in ancient Egyptian civilisation. It had been recorded that about 288 species of grasses were to be stored for the cattle, including 44 of which are cultivated cereals, some numerous fodder plants, and a rare quantity of medicinal herbs and ornamentals. (Cope in 2005). With the production of the well-preserved plant macro remains are adequately characterised in the archaeological sites in Egypt. (Fahmy in 2004). An examination of plant macro-remains dating back to the Holocene era, specifically since 12,000 BP, has demonstrated that forager societies in the Sahara primarily relied on wild grasses as their main dietary staple. Climatic changes that occurred during the last Ice Age brought about large, shallow lakes and short grasslands in the areas of the Sahara. (Fagan in 1999). The population of the foraging Sahara flourished in the areas of wilderness recently. (Fahmy in 2001).

There was the cultivation of sorghum in the area of the Nabta Playa, which was made possible by the dry farming technique, eventually leading to its domestication. (Wasylikowa and Dahlberg in 1999). As many reports suggest, sorghum was not cultivated during the Pharaonic era. Sorghum was considered the main cereal of the civilisation cultivated in southern Egypt.(Tackholm and Drar in 1941).

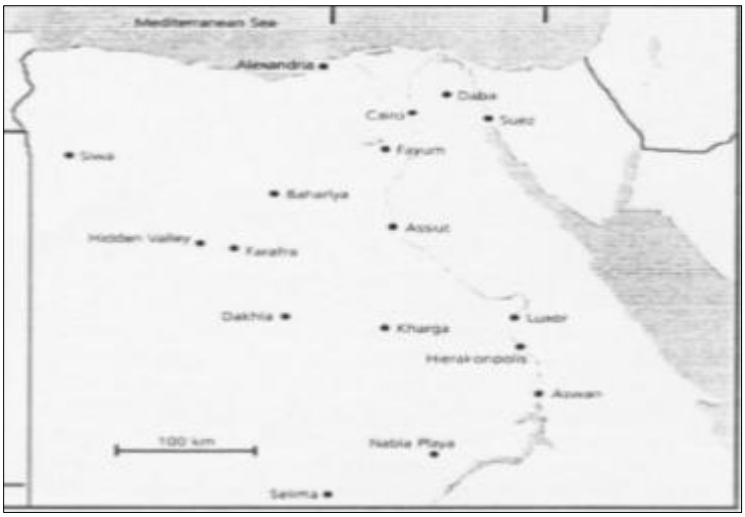

Figure 6 Pre-dynastic Archaeological Sites along the Nile Valley (Loutfy Boulos and Ahmed Gamal-El-Din Fahmy in 1999)

Some sources and studies are concerned that the domestication of wheat and barley was to be carried out in the Fertile Crescent of Southwest Asia. Since 10,000 B.C., farmers who resided along the river valleys of the Euphrates and Jordan Valley have cultivated wheat and barley there. (Zohary and Hopf 1995). Around the time period of 8000 B.P., villages with agricultural backgrounds flourished here rapidly. These settlements are to be found buried underneath the deep layers of sand and gravel for about a thousand years of the annual flood. (Zohary and Hopf 1995). Evidence of the high frequency of Emmer wheat remains is to be spotted and unearthed around the settlements of Maadi and Hierakonpolis, further demonstrating the cereal's significant role during the pre-dynastic period. The early Egyptians considered it to be a holy activity. The Pharaohs used to sponsor some of the work and then commemorate it as a symbol of goodness. They used to express beastly in the inscriptions, like, "I brought the Nile to the upland in your fields so that plots were watered that have never known water before. I caused the water of the Nile to flood over the ancient landmarks" (Sustainable Agriculture by J, Donald Hughes, p – 17).

There was a need for wetlands, plants, flora and fauna while sustaining the ecology of the sacred land threatened by the desert. The acute habitats of different plants and animals were finally shrinking out and then forced to disappear. The disappearance was happening so slowly that many of us didn't notice, 'What was happening?'

The work of a farm labourer is to tend and maintain his crops. Similarly, it was the responsibility of the herders to take care of the animals, protect them from the elements and thieves, and maintain a proper, balanced diet. There was a lot of moisture to hold in the entire Nile Valley, along with many parts of the eastern and western parts of the desert, to offer enough humidity. However, during the summer months, a problem arises: the grasses lose essential minerals and proteins. So, the issue of overgrazing was seen to be shared during that time. The land in Egyptian civilisation was so prosperous for cultivation that it has a probability ranging from 0 to 95 percent. A mixed strategy for both farming and herding was thus applied. This was a precise system that the ancient Egyptians employed. (Brewer et. Al in 1994, p – 144).

Table 2 This table discusses the earliest example/estimate of incorporation in Egyptian Agriculture

Farming Goods	**Neolithic dynastic**	**Early dynastic Kingdom**	**Old Kingdom**	**Middle Kingdom**	**New Kingdom**	**Late Period**	**Greek**	**Roman**
Sorghum					X			
Olive						X		
Caster				X				
Safflower						X		
Carob					X			
Jujube			X					

Persea				X				
Pomegranate					X			
Watermelon				X				
Chate Melon					X			
Leek				X				
Garlic		X						
Onion			X					
Pea	X							
Faba bean				X				
Chickpea						X		
Lettuce				X				
Celery								X
Radish								X
Swine	X							
Donkey	X							
Horse						X		
Camel							X	
Cat	X							
Dog	X							
Goose						X		
Chicken								X
Honey bee				X				

According to the historian Murray, it is agreeable that agriculture was possibly established in Egypt around the eighth millennium B.P., along with a range of domesticated crops from the Levant. (Trigger in 1983, Wetterstrom in 1995, Zohary and Hopf in 1993). Due to the foundation created by the establishment of Emmer and Barley, a defined and well-established hunting-gathering practice followed thereafter. (Hassan in 1984, Wetterstrom in 1993). The Emmer and barley were to be found in Egypt for the first time around 7,300–6000 B.P. (Hassan in 1988, Wetterstrom in 1993, Zohary and Hopf in 1993). Emmer wheat and barley continued to be the most essential cereals produced up to Graeco-Roman times. (Murray 2000). There has been a prolonged dispute about several findings about naked barley.

(Helbaek in 1959). There is a list of grasses to be found, compiled after (de Vartavan & Asensi Amoros in 1997): -

- Argilops ventricosa Tausce
- Aeluropus lagopoides (L..) Trin. ex Thwaites
- Agrostis stolonifera L.
- Alopecurus myosuroides Huds.
- Arundo Donax L.
- Avena sp.
- Brachiaria sp.

Moreover, for the demand for wood, the palm trunk was used; the fronds were used for weaving, and the fibrous bark was used for making rope. (Tackholm and Drar in 1950; Nixon in 1951 p – 140). The doum plant was widely used during Badarian times in Egyptian civilisation. Basically, the people used the plant for flavouring the cakes, and the stone was used for making buttons, beads, and rings. The doum plant appeared to be the most valuable asset, as it proved to be a denser wood than date palm. (Tackholm and Drar in 1950; Mannicke in 1989 p – 141). Under cultivation, propagation

is vegetative, with the farmer choosing only the most prodigious trees to replant and expand the orchard. (Zohary and Speigel-Roy in 1975 p – 140). Both forms of the figs are considered to have been introduced from the eastern and southern parts.

Figure 7 Sycamore Fig in the Ancient Egyptian Civilization

Figs are also mentioned in the pyramidal texts, and Pharaoh Ramesses III claimed to have offered 15,500 measures of figs to Amun-Ra (Storey in 1976; Darby et al. in 1977 p - 140). During the early 5th Dynasty, the production of wine collected from the grape vines was typical in the civilisation, even though some written records imply that some vineyards produced a sustainable amount of wine for the civilisation.

An average vineyard produces about 1200 jars of good wine and about 50 jars of medium wine annually. (Lauer et.al in 1951; Johary and Speigel Roy in 1975; Darby el al. in 1977 and Zohary in 1987 p - 139). There were many depictions of wine production during the Old, Middle, and New Kingdoms. During the hot and dry climates in Ancient Egypt, the grapes were grown 1.5–2 metres off the ground to decrease the reflection of the sun's heat and allow the breezes to keep the fruit as cool as required. After the grapes were carefully plucked from the vines, they were placed inside a vat, which they used to crush them by treading. Then, the skins were put into a cloth bag, which was then twisted to squeeze out the remaining juice. Fermentation happens on the grapes because of the hot environment, and yeast does occur on them. It then progresses rapidly to create a thin, watery wine. Then, the finished wine was poured into the jars for storage and covered with reed and clay stoppers.

Figure 8 This is the process of how grapes were collected from the grape vines and then prepared to produce wine ('The Egyptian World')

The tomb paintings depict pink, green, white, red, and blue grapes, and some New Kingdom scenes show a dark red wine pouring out of the vats. (Lutz in 1922, p – 139, The Egyptian World). Some scholars depict that it represented geographic origin, not the colour of the wine. (Budge in 1898, Kees in 1961, Darby et al. in 1977 p – 139). The production of wine holds a special place in Egyptian life. Still, the growth of palm trees across the Egyptian landscape holds significance. Around 30 B.C., when the Romans conquered Egypt, it was taxed one-third of the Roman food supply; an average estimation was made out of around 20,000,000 tables, or 135,000 tonnes of grain...

During ancient times, Flax, scientifically known as Linum usitatissimum, was extensively grown mainly for its seeds and fibres, which were employed in producing oil and various linen goods. According to Pliny the Elder, the Egyptian Flax takes the name of the region from which it was born. Growing Flax was significantly more lucrative than cultivating grain from farmers' perspective. The farmers paid, in terms of money, from 3 to 5 dinars in kharaj per faddan, depending upon the location of the land, ranging from the Delta to Upper Egypt. (Ibn Mammati in 1147-1209).

Researchers in the Saharan desert find evidence of many ancient colonies living partially sedentary lives around the ephemeral lakes. (Garcea in 2006, Bubenzer and Reimer in 2007).

Figure 9 The small playa, Lake Ephemera, one after the occurrence of precipitation ('Habitat Hysteresis in Ancient Egypt' by Judith Bunbury)

Some correspondences exist between the observations made in Kharga and Farafra and others across the Egyptian Sahara, from Fayum in the north to Nabta Playa (Wendorf and Schild in 1998). According to the information provided by Karin Kindermann, the most extended period of settlement at Nabta Playa lasted around 500 years, during which stone tools similar to those of the Djarra B type found in the White Desert to the north were commonly used. Typically, this period extended from approximately 5800 BC to 5300 BC...

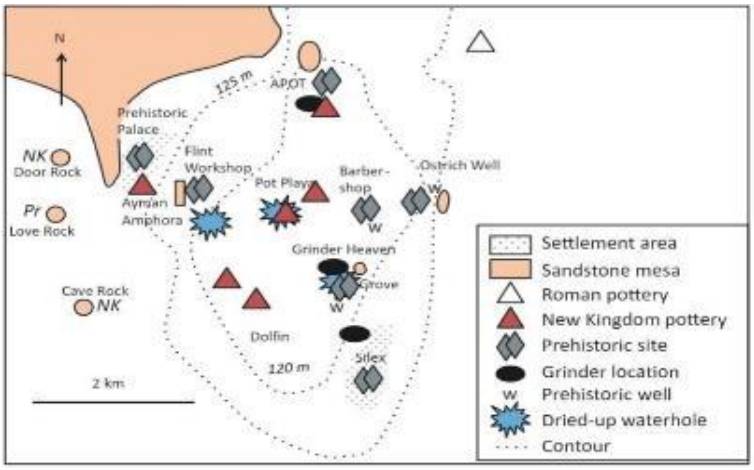

Figure 10 Dolfin Playa in the Kharga basin showing the distribution of sites around the playa, including the rock art sites of prehistoric and New Kingdom ('Habitat Hysteresis in Ancient Egypt' by Judith Bunbury)

Again, further north, the contemporary settlements in the Fayum generally focus on hearths constructed on high grounds rather than huts near the lakebed. (Holdaway et al., in 2018). Archaeological evidence indicates that the primary diet was centred around fish, supported by grains, occasional game consumption, and minimal pastoral activities. Moreover, the discovery of well-preserved buried baskets suggests that grain storage was already in place during this period.

2. Dakhla Oasis – The hidden gem

El Dakhla stands as one of Egypt's most stunning oases, boasting impressive monuments, breathtaking natural landscapes, and a wide array of handcrafted Bedouin souvenirs available in the towns of Dakhla Oasis. Like other oases in Egypt's Western Desert, Dakhla Oasis is located within a depression. Being located in the southernmost part of Egypt previously and historically, it was situated in the heart of the vital caravan-type trading route that generally helped in linking all three Oasis of Dakhla, Farafra, and Kharga. Dakhla Oasis is rich with numerous water springs, such as "Bir Talata" (known as a well) and "Bir El Gabal" (also known by the name of the well of the mountain). These freshwater springs have emerged as the top tourist destinations in Dakhla Oasis due to their superb warm water and tranquil ambience. There were as few as sixteen villages in the whole region of Dakhla Oasis; the largest among them is the 'Village Mut', which has a population of 100,000 inhabitants. Thus, this feature makes it a village more than a city. The depression of the Kharga Oasis is about 25,000 to 30,000 square miles, and the population is mainly of Arabic origin, with only 8,500.

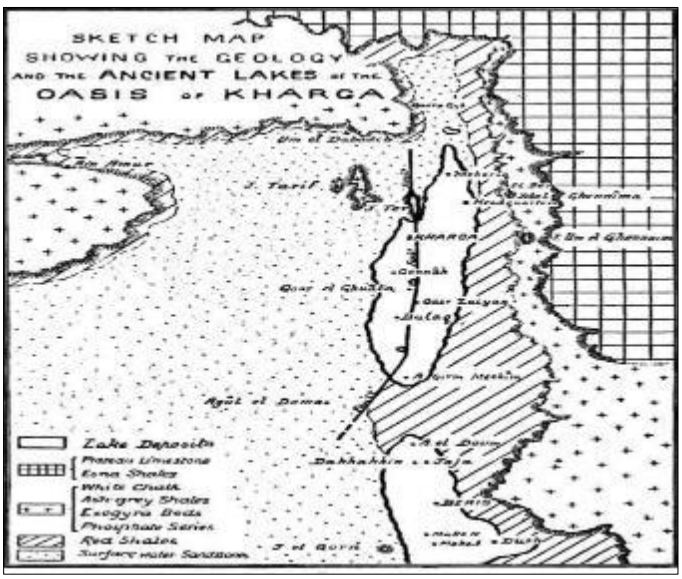

Figure 11 An Egyptian Oasis

The Village of Al Qasr is further located in the northern part of the village of Mut, and it appears to be one of the most attractive villages in the region of Dakhla Oasis. It is surrounded by remarkable monumental structures and ancient wonders that enhance its attractiveness. At the heart of the village of Al Qasr stands the minaret of Sheikh Nasr El Din Mosque. Originating from the Ayyubid era, spanning the 11th and 12th centuries, the only surviving element of this significant monument is its 21-metre-tall minaret. The village also hosts historic Islamic residences featuring doors adorned with acacia wood, where the owner's or builder's name is intricately carved. Deir El Hagar, also known as Stone Monastery, lies nearer to the cemetery of Al Muzwaqa and in the northern region of the village of Mut. Erected in the mid-1st century A.D. under Nero's rule, a temple was devoted to the Holy Theban Triad, comprising the deities Mut, Amun Rae, and Khonsu. Subsequently, Deir El Hagar underwent renovations during the Roman Emperors Vespasian, Titus, and Domitian reigns. The complex was expanded during this period, and numerous intricately carved bas-reliefs were incorporated. During its prime, Deir El Hagar was enclosed by substantial mud brick walls measuring 16 metres in length and 7 metres in width. The Village of Bashindi is a historically preserved, quantitative, and delicate area. Originating about 40 kilometres from the eastern region of the village of Mut. It was popularly inhabited by many people during the 11th and 12th centuries. Bashindi Village is known for its numerous mud-brick houses adorned with intricate decorations and vibrant ornaments, attracting tourists for exploration. The Mausoleum of Bashindi was built by placing a substantial mud-brick edifice with a dome over the Roman cemetery. This burial ground contains elaborately

decorated tombs, such as Kitines, painted in the Pharaonic style. Additionally, there is a cemetery dating back to the Roman rule. The 1972 World Heritage Convention, officially titled

The UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage introduced the notion of cultural landscape in Article 1.

Although not in this time as in antiquity, much of the water supply has been vanquished. Being a prosperous agricultural centre, the Kharga Oasis produced wheat, barley, and other kinds of dates, grapes, and different types of fruits. During the time period of the 26th Dynasty, the wine from Kharga was exported throughout the ancient world.

Figure 12 North Kharga Oasis Survey (NIKOS) co-director uncovered the rock art panel dating about 3700 B.C. ('A visual journey through Egypt's Frontier' by Salima Ikram)

Figure 13 Small grinding equipment, stones for making flour, blades, scrapers, pounders and as ('A visual journey through Egypt's Frontier' by Salima Ikram)

The vegetation consists of many types:-

- Date palms
- Dompalms and it's few categories
- A Large Saya tree
- "It" bushes rather than trees.
- Halfa Grass

2.1. (Selima Ikram in 2021)

One-third of the date trees increased to about 2000 (Bimb and Hodgson in 1903). The trees had obtained a certain height and were untended into thickly matted clumps. Different experiments have been conducted on the part of shoots gathered from the river in thirteen sacks. Still, no one could buy them; eventually, they bred worms. (M.A. Saleh and Eff. Zaki in 1915). The government has a valuable source of revenue and invests it further (Hodgson in 1903).

2.1.1. Administration

There was a theocratic monarchic system prevalent in Egypt.

Civilisation The King was considered a representation of God on Earth and ruled under the mandate of the gods. He was supposed to be a mediator, the intermediary between the familiar residents and the divine or omnipotent power. The establishment of a central government in Egypt can be traced back to around 3150 BCE, during King Narmer's unification.

Before this period, the Scorpion Kings of the Pre-dynastic Era (c. 6000–c. 3150 BCE) governed monarchically. Still, the exact functioning of their government remains unclear. Egyptologists in the 19th century categorised the nation's history into periods for better scholarly organisation. Periods characterised by a strong central authority are termed 'kingdoms.' In contrast, those marked by disunity or the absence of a central government are called 'intermediate periods.' Many scribes and scriptures to be discovered belonging to the Middle Kingdom of Egypt (C. 2040–1782 BCE) might be related to the First Intermediate Period (2181–2040 BCE) as a time of woe.

According to the great historian and Egyptologist Toby Wilkinson, *"The Shemsu Hor would have served several purposes simultaneously. It allowed the monarch to be a visible presence in the life of his subjects, enabled his officials to keep a close eye on everything that was happening in the country at large, implementing policies, resolving disputes, and dispensing justice; defrayed the costs of maintaining the court and removed the burden of supporting it year-round in one location; and, last but by no means least, facilitated the systematic assessment and levying of taxes. A little later, in the Second Dynasty, the court explicitly recognised the actuarial potential of the Following of Horus. The event was combined with a formal census of the country's agricultural wealth."*

Juan Carlos Moreno Garcia further comments on the Ancient Egyptian Administrative system. ("The study of Ancient Egyptian Administration," pp 1-17). He emphasised the widespread use of titles in ancient Egypt and the spread of democracy. He was implicitly following Max Weber's definition of bureaucracy in his content. The Egyptian social structure was characterised by a hierarchical system, with the pharaoh holding absolute power at the apex. Below the pharaoh, the most privileged social groups occupied positions near the top. At the same time, each subsequent subgroup exhibited a gradual increase in population size as it descended through the lower levels of society. Mentuhotep II ruled from Thebes, establishing a new dynasty after overthrowing the previous kings. Despite this, he modelled his governance on the Old Kingdom's principles. The Old Kingdom was revered as a splendid era in Egypt's history, with the grand pyramids and extensive complexes in Giza and other locations serving as powerful symbols of past greatness. According to historian Bunson, he said,

"In general, the central government's administrative offices were duplicates of the traditional provincial agencies, with one significant difference. In most periods, the offices were doubled, one for Upper Egypt and one for Lower Egypt. This duality was also carried out in architecture, providing palaces with two entrances, two throne rooms, etc. The nation viewed itself as a whole, but certain traditions dated back to the legendary northern and southern ancestors, the semi-divine kings of the pre-dynastic period, and the concept of symmetry."

Additionally, the Nile River is a crucial source for drinking water, fishing, and raising livestock, contributing to the production of meat and dairy products such as halloumi and kariesh cheeses. The Nile River's presence ensures a consistent supply of nutrient-rich soil, fostering the growth of essential crops. The yearly flooding of the Nile brings in fresh layers of fertile silt, promoting stable agriculture and facilitating the cultivation of diverse food crops and livestock. Consequently, Egypt has enjoyed a wealth of varied staple food sources for thousands of years due to these interconnected factors. These three determining factors' power, wealth, and influence, reached their zenith point during the reign of different pharaohs who proved their significance in ancient Egypt, like Thutmose III, Tutankhamen, and Rameses II.

Following the assassination of Ramses III in 1155 B.C., the formidable Egyptian Empire began a gradual decline due to an extended period of drought, economic challenges, and the incursions of foreign invaders seeking opportunities. The ruler ruled for a mere 31 years and was regarded as the last of the magnificent pharaohs of the civilisation. During their reign, many foreigners invaded Egypt, which is referred to by the residents thriving beside the Nile Valley as 'Sea Peoples.' Following Ramses III's demise, Egypt witnessed a succession of ineffective pharaohs, all bearing the name Ramses. The final ruler of the New Kingdom, Ramses XI, who passed away circa 1070 B.C., marked the end of this era. Archaeological findings from this time provide insights into the factors contributing to Egypt's swift decline. Egypt was utterly withdrawn and removed from the parts of Sinai and Canaan by 1140 B.C. According to the historian Cline, "It's a shocking crime, but the reign of Ramses IX is just the beginning of a sustained period of royal tomb robberies."

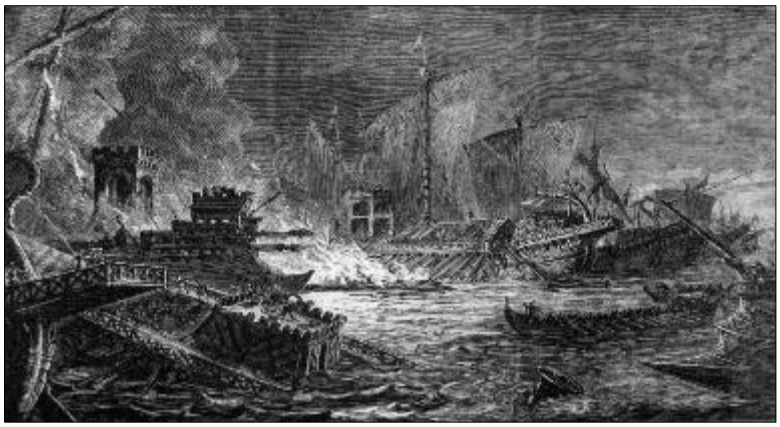

Figure 14 the Roman Civil War of 31 B.C., Octavian, later known as Emperor Augustus, engaged in a pivotal naval clash off the coast of Greece at the Battle of Actium. This decisive encounter saw Octavian's fleet triumph over the combined Roman-Egyptian forces led by Mark Antony and Cleopatra. The outcome signified the conclusion of the final Egyptian dynasties.

The Ptolemaic Dynasty, reigning from 305 to 30 B.C., marked Egypt's final period of significant achievement. These Macedonian Greek pharaohs, succeeding Alexander the Great, were exemplified by Cleopatra VII, the most renowned among them. Cleopatra played a key role in establishing the splendid Hellenistic capital of Alexandria. Some scholars even suggested that there was a massive outbreak of the smallpox disease, which became uncontrollable. Specific experts propose that this could be among the earliest documented instances of isolation measures due to a disease, indicating a potential smallpox outbreak in Egypt during that period. Observations of Ramses V's mummy reveal facial scars suggestive of smallpox. Although the cause of his death remains uncertain, historical records mention Ramses V and his family being interred in recently excavated tombs, coinciding with a documented six-month suspension of certain activities. In the 8th century B.C., the Nubians claimed the throne of Egypt and restored it to their name and fame peacefully. The Kushite Pharaohs succeeded the heirloom and ascended the throne; they took control of the civilisation for at least a century. They were further evacuated by the Assyrian invaders.

Following their defeat by Roman Emperor Octavian (Augustus) in 30 B.C., Cleopatra and Marc Antony's downfall led to Egypt becoming a province of the Roman Republic, marking the conclusion of the ancient Egyptian dynasties. According to Cline, 'Then the Assyrians came in, followed by the Persians, the Greeks, the Romans and then Islam.' In the past and future, Cairo's existence hinges on the Nile's continuous flow. Since its establishment in the 10th century CE, the city has expanded onto previously untouched terrain shaped by the persistent waters of the Nile. The most recent districts in modern Cairo are nearest the river, emerging on land submerged beneath the Nile's waters centuries ago.

This changing pattern of rainfall influences the alternating low and high flows that define the dynamic and fertile system of the Nile. According to researcher Francesca Casale at Politecnico di Milano, "We can see that in three years of low water level of the Nile River caused a period of drought and its consequences of famine, with an increase of a food product price and as a consequence, in the end, the death of a large part of the population." According to Casale, "We found a nexus between changes in hydrology and climate in the past and social and economic events like social disorders, conflicts, plagues, famines, and population displacement." Between 542 and 600 CE, a drought facilitated the spread of a plague that ravaged Byzantine Egypt. In the area of the Ptolemaic Kingdom from 305 to 30 BCE, a drought induced by volcanic activity led to social and political unrest.

At around 542–600 CE, Egyptian civilisation under the Ptolemaic regime had to suffer a drastic volcanic-induced drought, which further triggered socio-political turmoil in the future of the civilisation. A comparable crisis occurred during the Middle Kingdom circa 1700 BCE when floodwaters, reaching twice the volume of the contemporary Nile, inundated the region. Additionally, around 2200 BCE, the Nile's flow sharply declined to a 200-year low, subjecting the Old Kingdom to drought, famine, and a tumultuous period marked by cannibalism and civil conflict. While the threat of a disruptive flood cycle may have lessened, the concern about potential escalation between the two nations highlights humanity's desire for stability in a dynamic environment. With human activities exerting growing influence on the Nile's flow, the stability issue takes on geopolitical significance. Casale further commented and continued on this topic. "In particular, for irrigation and agriculture, we can compare this modern case study with the event of the end of the 12th century when, for the same condition, we have a case of drought or famine and the death of part of the population."

3. Conclusion

The cornerstone of the ancient Egyptian economy was agriculture, which was crucial for the well-being of the local populace. Agricultural activities originated in the Delta Region of northern Egypt and the fertile Fayum during the Pre-dynastic Period (approximately 6000-3150 BCE). However, signs of the utilisation and excessive exploitation of the land date back to 8000 BCE. A famous and enlightened historian named Margaret Bunson further defines the practice of Egyptian irrigational systems and agriculture as "the science and practice of the ancient Egyptians from pre-dynastic times that enabled them to transform an expanse of semiarid land into rich fields after each inundation of the Nile." In conclusion, the prospect of religion was important in Egyptian civilisation and life. They succeeded in making huge capital and wealth, but they did not contribute this knowledge to other sectors. According to the famous historian Jacquetta Hawkes, "Nevertheless, it was a civilisation that lived on its own terms and is ruined today, showing us how blessed a civilisation it was. The best town to be developed is known to us as Saqqara, and its old-age capital was centred around Memphis. Agriculture was important during the Old Kingdom of Ancient Egypt, serving as the cornerstone of the ancient Egyptians' sustenance and economic activities. The fertile Nile riverbanks and advanced irrigation systems enabled continuous cultivation of diverse crops throughout the year. Livestock, including meat, dairy, and wool, was pivotal in the Old Kingdom diet, offering nutritional variety alongside the grain-based staples. Art and literature from that era frequently depicted these animals, underscoring their crucial role in the daily lives of the ancient Egyptians.

A civilisation that took inspiration from the tremendous Mesopotamian civilisation for its upliftment and growth towards a significant urban centre.

Mainly inspired by the process of coming and going of Asian traders. Many Mesopotamian seals were also found there in Egypt, which suggested trade activities between Egypt and Mesopotamia, which flourished over the following years. The ancient Egyptians viewed food as sustenance and a crucial element intertwined with their culture and religious beliefs. They held the belief that what they ate directly influenced both their physical health and spiritual well-being. Consequently, the preparation and consumption of food held immense importance and were approached with meticulous care.

The Egyptians could embark on ambitious projects due to a substantial agricultural surplus. This surplus resulted not only from the fertility of the Nile Delta but also from the Egyptians' adeptness at farming and irrigation. Employing innovative techniques, they cultivated various crops, such as wheat, barley, and fruits. The Egyptians excelled in the meticulous preservation of deceased bodies, having mastered the art of mummification by the Fourth Dynasty. Successful preservation relied on a deep understanding of human anatomy and fundamental chemical principles. This specialised practice required extensive training. Regrettably, the knowledge gained from mummification did not contribute to medical breakthroughs. Although those skilled in preserving bodies gained valuable insights into human anatomy, priests preferred magical charms and spells over applying this knowledge to medical advancements, resulting in a missed historical opportunity for the progress of medicine. While the Egyptians are generally acknowledged for not making significant strides in astronomy, they did manage to create a functional calendar. They accurately calculated the year length, consisting of 365 days, in the ancient Egyptian calendar. This year was divided into 12 months, each comprising thirty days. The calendar started anew on July 19. To address the discrepancy caused by skipping one-fourth of a day annually, a fresh calendar was instituted with the ascension of a new pharaoh, abandoning the calendar of the previous ruler.

Many fundamental theories have been later carried forward towards their origin. These research and articles were reviewed and highlighted by H.E. Winlock. ('The Origin of the Ancient Egyptian Calendar' American Philosophical Soc.,83, No.3, in 1940). The natural occurrences that initially indicated the shifting seasons for the ancient

The Egyptians became the basis of their calendrical system. On the Ethiopian Plateau, the annual inundation of the Nile is primarily caused by the tremendous monsoonal rains there. One of the branches of the main Nile river, the Blue Nile, originates at Lake Tana. These made them rise to a certain level of river water. Following the recession of the river, the planting season commenced in October and November as the floodwaters diminished, allowing the fields to drain. From August to January, the Nile served as a source of irrigation by directing water into the fields. Still, by February, the water level had become insufficient. The agricultural cycle consisted of three stages: flood (also popularly known by the name of aches), germination (also popularly known by the name of peret), and harvest (also popularly known by the name of chemo).

Compliance with ethical standards

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The authors declare no conflict of interest related to this research.

Statement of informed consent

No individual participants were involved in the study, requiring informed consent.

References

[1] Pollard, E., Rosenberg, C., & Tignor, R. (n.d.). *Worlds together, worlds apart.* Oxford University Press.

[2] Herodotus. (n.d.). *Histories* (A. D. Godley, Trans.). Harvard University Press.

[3] Google Maps. (n.d.). *Location of Egypt in Africa.* Retrieved from https://www.google.com/maps.

[4] Hume, W. F. (1925). *Geology of Egypt, Volume 1: The surface features of Egypt and its geological history.* Government Press, Cairo.

[5] Said, R. (1962). *The geology of Egypt.* Elsevier.

[6] Bowman, A., & Rogan, E. (Eds.). (1999). *Agriculture in Egypt: From pharaonic to modern times.* Oxford University Press.

[7] Willcocks, W., & Craig, J. (1913). *Egyptian irrigation.* E. & F. N. Spon.

[8] Hurst, H. (1952). *The Nile: A general account of the river and its utilization.* Macmillan.

[9] Hurst, H., & Black, R. (1963). *Hydrology of the Nile basin.* UNESCO.

[10] Leibovitch, J. (1963). *Gods of agriculture and welfare in Egypt.* Journal of Near Eastern Studies, 22(4), 273-285.

[11] Butzer, K. (1976). *Early hydraulic civilization in Egypt: A study in cultural ecology.* University of Chicago Press.

[12] Beaumont, P. (1993). *Agricultural development in the Nile Basin.* In P. P. Howell & J. A. Allan (Eds.), *The Nile: Sharing a scarce resource* (pp. 119-146). Cambridge University Press.

[13] Gardiner, A. (1948). *The Wilbour Papyrus.* Oxford University Press.

[14] Menu, B. (1982). *Les grands domaines dans l'Égypte ramesside.* Institut Français d'Archéologie Orientale.

[15] Eyre, C. J. (1994). *The use of documents in pharaonic Egypt.* Oxford University Press.

[16] Manning, J. G. (1999). *Land and power in Ptolemaic Egypt: The structure of land tenure.* Cambridge University Press.

[17] Katary, S. L. D. (1999). *Land tenure in ancient Egypt.* In P. Bowman & E. Rogan (Eds.), *Agriculture in Egypt: From pharaonic to modern times* (pp. 61-81). Oxford University Press.

[18] Jansen, A. (1986). *Grain storage and distribution in ancient Egypt.* Journal of Egyptian Archaeology, 72, 79-95.

[19] Donker van Heel, K. (1998). *The legal status of women in ancient Egypt during the New Kingdom.* Peeters Publishers.

[20] Brewer, D. J., & Teeter, E. (1999). *Egypt and the Egyptians.* Cambridge University Press.

[21] Dixon, C. (1969). *Land tenure in ancient Egypt.* Journal of Economic History, 29(2), 194-212.

[22] National Geographic Society. (1978). *Ancient Egypt: The story of civilization.* National Geographic Books.

[23] Zohary, D., & Hopf, M. (1993). *Domestication of plants in the Old World.* Oxford University Press.

[24] Hassan, F. A. (1988). *The growth and spread of agriculture in the Nile Valley.* In T. Shaw et al. (Eds.), *The archaeology of Africa: Food, metals, and towns* (pp. 317-332). Routledge.

[25] Murray, M. A. (2000). Ancient Egyptian materials and industries. Cambridge University Press.

[26] Helbaek, H. (1959). Domestication of plants in prehistoric Egypt. Acta Archaeologica, 30, 112-135.

[27] Vartavan, H., & Asensi Amoros, R. (1997). Codex of ancient Egyptian plant remains. Triade Exploration.

[28] Lutz, H. (1922). Textiles and clothing of ancient Egypt. Yale University Press.

[29] Budge, E. A. W. (1898). The mummy: Chapters on Egyptian funerary customs. Cambridge University Press.

[30] Kees, H. (1961). Das alte Ägypten: Eine kleine Landeskunde. C. H. Beck.

[31] Darby, W. J., Ghalioungui, P., & Grivetti, L. (1977). Food: The gift of Osiris. Academic Press.

[32] Garcea, E. A. A. (2006). An alternative pathway to food production: The case of the Libyan Sahara. Quaternary International, 151(1), 95-112.

[33] Wendorf, F., & Schild, R. (1998). Nabta Playa: The earliest astronomical alignments in the Old World. Journal of African Archaeology, 23(2), 89-113.

[34] Bunbury, J. (2021). Habitat hysteresis and hydrological variability in ancient Egypt. Nature Communications, 12(1), 4567.

[35] Holdaway, S., Wendrich, W., & Emmitt, J. (2018). The desert Fayum revisited: The preservation of archaeological sites in arid environments. Journal of Archaeological Science, 97, 1-12.

[36] Ikram, S. (2021). Ancient Egypt: A visual journey through the frontier. American University in Cairo Press.

[37] Saleh, M. A., & Zaki, E. (1915). The flora of ancient Egypt. Bulletin de l'Institut d'Égypte, 6, 87-108.

[38] Fahmy, A. G., & Fadl, M. A. (2021). Plant macro-remains from Old Kingdom settlements in Egypt. Vegetation History and Archaeobotany, 30(4), 567-584.

[39] Moreno Garcia, J. C. (2021). The study of ancient Egyptian administration: New approaches and perspectives. Journal of Egyptian Studies, 1-17. Retrieved from https://www.journals.uchicago.edu.

[40] History.com. (n.d.). Battle of Actium and the end of Egyptian dynasties. Retrieved from https://www.history.com.