# From Homescape to Flora Landscape: A Preliminary Observation on Plant Remains from the Christian Mud-Buildings in the Third Cataract Region

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Mudbrick materials provide a source of environmental data to aid in understanding the diversity of local sediments and flora. Most studies begin with examining the origins of brick materials, which also can be studied as chronological markers, technology as social practice, as indicators of social class or cultural identity, and as a source of environmental information.[1] Given the active role of architecture as material culture mudbricks are a good source of botanical evidence since they often include desiccated chaff, straw, fruits, and seeds, chaff impressions, phytoliths, diatoms, and pollen.[2]

Archaeologically, earth construction techniques have been known for over 9000 years. Mudbrick (adobe) houses dating from 8000 to 6000 BCE have been discovered in Russian Turkestan.[3] Rammed earth foundations dating from ca. 5000 BCE have been discovered in Assyria. Earth was used as the building material in all

1 Alvaro et al., "The Study of the Fourth Millennium Mudbricks at Arslantepe"; Arpin and Goldberg, "Using Optical Microscopy to Evaluate Human History"; Morgenstein and Redmount, "Mudbrick Typology, Sources and Sedimentological Composition."

2 On the active role of architecture as material culture, see Love "Architecture as Material Culture"; Riggs, *The Architecture of Grasshopper Pueblo.* On mudbrick as a good source for botanical evidence, see Henn et al., "Desiccated Diaspores from Building Materials." On chaff impressions, see Wilcox and Fornite, "Impressions of Wild Cereal Chaff." On phytoliths, see Ryan, "The Phytolith Evidence." On diatoms, see Flower, "Diatoms in Ancient Building Materials." On pollen, see Ayyad et al., "Mudbrick as Bearer of Agricultural Information"; O' Rourke, "Pollen from Adobe Brick."

3 Pumpelly, *Explorations in Turkestan.*

ancient cultures, not only for homes but for religious buildings as well.[4] In Sudan, the study of earthen construction materials is very rare, mudbricks were considered common building materials that were used in Sudan from 2500 BCE, during the Kerma period, and are still widely used as building materials in many regions of Sudan. The materials used to make these bricks include Nile mud, sand, chopped straw, and animal dung. Makers mixed these materials in varying quantities to produce bricks with different characteristics.

Most importantly, these added materials vastly improve the tensile strength of bricks. Straw, and sometimes chaff, has always been the preferred type of temper. Alternatives may include chopped grasses or weeds, tree bark, and potsherds.[5] Hillman appropriately distinguishes between various classes of vegetal temper according to their derivation from the process of winnowing and coarse-sieving cereals, highlighting their commonly assigned different uses.[6] The first type, "fragmented light straw," is probably the type of vegetal temper most commonly used in mudbricks. The second type, "medium-coarse winnowed straw," features more commonly in mud plaster or is used as fuel; and the third is "chaff," which results from a later step during cereal processing, and may be used for bricks or wall plaster.[7]

From a general view of home architecture in ancient Sudan, two types of homescapes can be distinguished: external and internal, in which plants are essential elements in both. Plant remains can help us to understand the architectural style of houses of the external homescape, such as wood, which represents an essential part of the architectural construction elements in mud buildings, as it has been used as roofs and pillars to support the roofs of buildings since early periods in Sudan. Also, hardwood trees represent an essential architectural element in the design and decoration of doors and windows. Also, in this type of home, *rākūba* or *ʿarīsha* is a crucial element of the house and is used for recreation and protection from the sun and heat during the hot summer seasons. Many trunks, stems and branches of trees are used in its construction of *rākūba,* in addition to palm and doum fronds. The trunks and stems of large trees also play an essential role in the building of animal pens.

As for the elements of the interior homescape, wood, palm and doum fronds are used as a basic element in the manufacture of home furniture, such as beds, wooden chairs, and *brooches* that are used as rugs for sitting. In addition palm and doum palm leaves

4 Minke *Building with Earth Design and Technology of a Sustainable Architecture,* pp. 11—12.
5 Van Beek and Van Beek, *Glorious Mud!,* p. 135.
6 Hillman, "Traditional Husbandry and Processing of Archaic Cereals in Recent Times," pp. 127—8.
7 Homsher, "Mudbricks and the Process of Construction in the Middle Bronze Age Southern Levant," p. 3.

were used in the manufacture of ropes, shoes, as well as hangers called locally *"mashlēb"* which are used to place food utensils in high areas of the ground and *ṭabag* which are used for the covering food. In the internal homescape of Sudanese houses wood is also used to manufacture what is called "Sahara" which is used to store clothes, decorative items, and other items inside homes. In addition, human clothing is made from materials that come directly or indirectly from plant fibers, and there is much evidence of textiles made from cotton and linen reported from archaeological sites in Sudan. In the process of preparing foods, there are many household tools in which wood and plants are the basic elements in their manufacture, such as what is called *"fundōk"* and *"madakk"* which are used to grinding grains and other food items. Other tools that were used in the homes such as spoons and handles for knives were made from the plants.

There is no doubt that plants are an essential element in the manufacture of equipment and tools in agricultural societies from ancient Sudan. The archaeological record of many sites in Sudan provides much evidence of composite agricultural tools, i.e. wood and plants formed part of them, such as the *shadōf* and the *sāgiya,* which form the basic elements in the manufacture of all parts, as well as other agricultural tools, such as shovels, sickles, rakes, garden hoes, shears, and mattock.

In terms of daily lifestyle, the remains of grains and cereals provided evidence of the types of plants that were used as a part of human foods and drinks. There are two types of plant foods and drinks in Sudan: fermented and unfermented foods, which include bread, porridge, and *kisra,* and drinks such as local wine, *ḥilumurr, ābreh, sharbat* and others.

## Area of study

The El Mahas region lies along the Nile, in northern Sudan (Fig.1) beginning at the north end of the Dongola Reach and extending from the area of the villages of Hannek (west bank) and Tombos (east bank), at the top of the Third Cataract, downriver as far as the area of Jebel Dosha (west bank) and Wawa (east bank), in the north. Its northern boundary is most visibly marked by the cliff-face known as Jebel Dosha which overlooks the west bank of the river some five kilometers downstream of Soleb, the end of a long ridge that runs approximately three kilometers into the desert to the west-northwest, forming a prominent natural feature. The region extends over a distance of approximately 141 kilometers (ca. 88 miles) from Hannek to Wawa. Within this area, the landscape is highly varied, including some very fertile localities with abundant alluvial soils

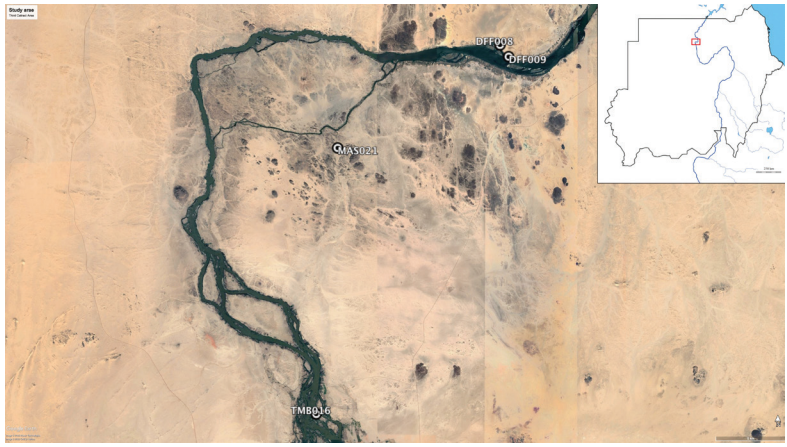


Figure 1.
The area of study.

but also many extremely barren and inhospitable areas (Osman and Edwards 2012: 6-7). The Mahas Archaeological Project, directed by Ali Osman Mohamed Salih, identified four Christian mudbrick sites located in the different three main areas (north, middle, and south) of the El Mahas region in April 2019. I chose these four sites to serve as case studies for the study of mudbrick inclusions in Christian Sudan.

These four sites can be described in brief as follows:

- **Site (1) TMB016 (19°42.935/30°22.72):** This site was located near the north end of Dabaki island on a prominent rock outcrop overlooking the river. Here, the denuded remains of a massively built mudbrick enclosure, measuring approximately 75 x 35 meters, aligned approximately east-west. The only large areas of brickwork which survive are in the western corner towers and in the southeast quadrant where the walls measure over 3.5 meters thick and more than 4 meters high in some places. Perhaps they were elements of a fortified gateway opening to the south. Built on a very irregular surface, parts of the walls have substantial stone foundations, while other parts were built directly onto granite boulders. The builders used large bricks measuring approximately 39 x 20 x 11 centimeters. Within the enclosure, the only surviving structure is a small mudbrick church measuring 16.5 x 10.3 meters, with walls standing up to 2 meters high, constructed on a substantial mudbrick platform. In the southwest corner the lower part of a stairway survives rising over a small vaulted chamber. Most of the surface sherds appear to date to the Christian period (Osman and Edwards 2012) (Fig.2a).
- **Site (2) MAS021 (19°53.012/30°23.575):** The site is a medieval church built amongst large boulders of a small rocky spur running west

from Jebel Barja. This small, well-preserved mudbrick church measures approximately 8.5 x 9.5 meters and in places stands over 4 meters tall. Its east end is built against a massive boulder with rock drawings of a large human figure and two animals. The base of a small central dome survives, and traces of inscribed texts and wall paintings are visible on mud wall plaster. One local name for the site is Hambujneen Kisse (Osman and Edwards 2012) (Fig.2b).

- **Site (3) DFF008 (19°56.932/30°30.138):** The site is situated on a rocky hillock, with modern buildings on lower ground below the hill. It is a well-preserved medieval settlement known by local people as Tinutti. At least five substantial mudbrick structures can be identified. Several rooms still retain their barrel vaulting and parts of the central structure stand nearly 5 meters high. The more fragmentary remains of additional structures, including rougher stone-built buildings, surround these upstanding remains. None of the visible buildings appears to have been a church. Test excavations by the University of Khartoum in Building A, a poorly preserved structure, revealed most of its plan. Excavations also revealed stone foundations beneath the mudbrick superstructure of Building A. Aerial photos from the 1930s show that additional substantial upstanding remains survived on the site at the time (Fig.2c).[8]
- **Site (4) DFF009 (19°56.491/30°30.479):** This site was located on bare rocks on the north side of the thin band of cultivation in an otherwise inhospitable area of Haleeba. The main structure is a small tower-house ("castle-house") with thick stone foundations up to two meters high. Parts of its mudbrick superstructure still survive up to six meters high in its northwest corner. Some traces of its internal vaulted ceilings survive. No clearly defined entrance is visible in the bottom story. Most of the lower rooms were probably accessible only from above. Little surface pottery was found but the little that survived appears to be "Late" and "Terminal Christian" ceramic types. Outside this structure are traces of less substantial structures surviving as a few courses of rough stone walling (Fig.2d).[9]

## Materials and Methods

The samples were collected from the mud-brick constructions from the four sites (TMB016, MAS021, DFF008, and DFF009). The total volume of the materials was approximately 4 kilograms (1 kilogram

8 Mohammed, *A Survey of the Third Cataract Region*, p. 55; Osman and Edwards, *The Archaeology of a Nubian Frontier.*

9 Mohammed, *A Survey of the Third Cataract Region*, pp. 53 — 4; Osman and Edwards, *The Archaeology of a Nubian Frontier.*

Figure 2.
The four sites discussed in the chapter:
a) TMB016.
b) MAS021.
c) DFF008.
d) DFF009
(photos by Engineer Omer).

from each site). The organic residues of plants and animals could be easily observed in the samples before they floated in the water.

The material was soaked in water for six hours to dissolve the hard mud and to allow the wet sieving to separate the plant's remains that were floated above the mud and sand. Two metal sieves with a mesh size of 0.5 and 1 millimetres were used for the wet sieving to separate the plant remains. The separated material was dried and examined under binoculars in the Department of Archaeology, Faculty of Arts, University of Al Neelain (Sudan), and Institute of Archaeology, University of Nicolas Copernicus (Poland). To aid with identification, we used fresh seeds as a reference collection alongside determination literature. Some animal dung and insect remains were separated during the sorting processing of the plant macro-remains.

## Results and Discussion

*Results of extracted plant remains from the Homescapes*

Seven plant species were encountered as seeds. Fruits were extracted and identified from the mudbrick samples. The assemblage of seeds and fruits were preserved by desiccation. Table (1) shows the Latin names of the identified species and their distribution in the sites.

Table 1.
Plant species that were identified from the Samples.

| Species | Site (1) TMB016 | Site (2) MAS021 | Site (3) DFF008 | Site (4) DFF009 |
|---|---|---|---|---|
| *Triticum aestivum* | + | + | + | + |
| *Hordeum vulgare* | + | + | + | + |
| *Sorghum bicolor* | + | - | - | + |
| *Setaria italica* | - | + | - | + |
| *Adansonia digitata* | + | + | - | - |
| *Acacia nilotica* | - | - | + | - |
| *Cyperus rotundus* | + | - | + | + |
| *Acacia sp.? (tree bark)* | + | - | - | + |
| *Wild grasses? (Poaceae)* | + | + | + | + |
| *Unidentified* | + | + | + | + |
| *Animal dung* | + | - | + | - |
| *Insects remains* | - | - | + | - |

Cereals appeared clearly and can be identified from the seeds of:

- **Triticum aestivum** (Fig. 3a), added to some parts of spikelets, chaffs, and glume fragments.
- **Hordeum vulgare** (Fig. 3b), added to some parts of spikelets, chaffs, and glume fragments.
- **Sorghum bicolor** (Fig. 3c), present in spikelet with grain inside.
- **Setaria italica** (Fig. 3d), represented from its seeds.

Furthermore, for the trees:

- **Adansonia digitata** appeared from small fragments of the fruit pulp shell (Fig. 3e).
- **Acacia nilotica** was identified from the seed remains (Fig. 3f).
- **Cyperus rotundus** appeared in the materials from the complete purple nutsedge roots (Fig. 3g).

Some animal remains, animal dung (Fig. 3h), and insect remains (Fig.3i) appeared in the samples. More analyses for more detailed identifications will be done at a later date.

*Mudbrick as source of the plant remains*

The material from mudbricks is an important source of archaeobotanical and palaeoecological data of the crops, weeds, and other vegetation along the Nile floodplain. The mixture of the plant macro remains in mudbrick is heterogeneous because they came from different origins. These differences originate partly from the clay itself, partly from the plant materials added to the adobe as a

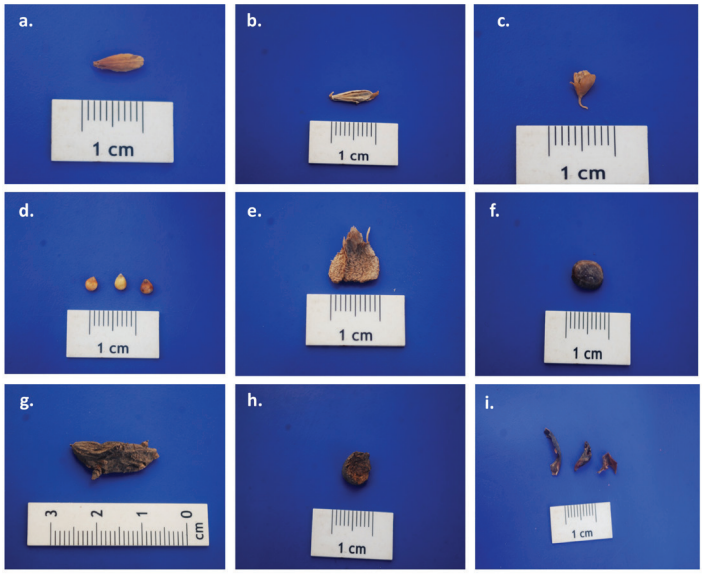


Figure 3. The figure presents the plant and animal remains that were identified: a. Triticum aestivum; b. Hordeum vulgare; c. Sorghum bicolor, d. Setaria italica; e. Adansonia digitata, f. Acacia nilotica; g. Cyperus rotundus; h. Animal dung; i. Insect remains (Photos by the author).

temper, and partly from the vegetation surrounding the site of brick manufacture.[10]

The identified plant species were added to the adobes either as a part of the temper or as an unintentional admixture coming into the mud material during the adobe processing. The fibers serve a number of key functions. First, they hinder cracking upon drying by distributing tension throughout the bulk of the brick. Second, they accelerate drying by improving outward drainage of moisture to the surface of the brick. Third, they significantly reduce the bulk density of the brick,lightening its weight and reducing its thermal conductivity. Most importantly, they increase the tensile strength of the brick, the lack of which is one of the inherent disadvantages of mudbrick.[11] The necessity of temper may vary depending on the quality of the sediment, clay, and organic material that was added to the mudbrick.

Experts in Sudan rarely study the archaeobotanical remains from mudbrick. Sergeev et al. studied the considerable potential of mudbricks as a source of the history, cultural practices, and technologies of ancient societies that developed in a specific natural environment.[12] Their analysis focused on comparing two collections of mudbricks from ancient capital regions of Egypt (Giza) and

10 Pokorná and Beneš, "Plant Macroremains from the Old Kingdom Mudbrick Construction of the Werkaure Tomb."
11 Homsher, "Mudbricks and the Process of Construction in the Middle Bronze Age Southern Levant"; Houben and Guillaud, *Earth Construction*, p. 82.
12 Sergeev et al., "Mudbricks from Giza and Abu Erteila."

Sudan (Abu Erteila). There were significantly different numbers of plant varieties recovered between these two sites. More than 7500 plant macro remains were recovered at Giza and only 430 at Abu Erteila. The difference was pronounced in the concentration of macroremains of cultivated plants which are common at Giza and are very rare in Abu Erteila. In addition, carbonized archaeobotanical materials common in mudbricks from Egypt are practically absent in all the samples from Sudan. Among the possible reasons for the imbalance could be the humble vegetation and a lower intensity of economic activity around Abu Erteila during the Meroitic Period. Alternatively, the Meroitic people may have preferred to use valuable organic waste from the processing of crops in other production spheres such as, for example, animal husbandry.

The evidence from Christian mudbrick from the Third Cataract shows that there is a high density of plant remains. This could be because Christian people in this area preferred to use valuable organic waste from the processing of crops in mudbrick production. This demonstrates that there was a different mudbrick technique used at the Meroitic sites in Central Sudan.

## The floral landscape in the Third Cataract during Christian period

### *Cultivated flora*

The archaeobotanical remains from the four Christian mudbrick buildings in El Mahas region show four cultivated plants *Triticum aestivum, Hordeum vulgare, Sorghum bicolor,* and *Setaria italica.* These cereals are packed with starch that contains an appreciable amount of protein. Food production in the Mediterranean basin, Europe, the non-tropical parts of Asia, and (to some extent) the highlands of Ethiopia, was based primarily on wheat and barley.[13] The remains of *Triticum aestivum* and *Hordeum vulgare* were present as grains and spikelets in the mudbrick samples from the four Christian sites. These two plants have been reported at many archaeological sites in Sudan. The analyses of phytoliths and starch grains from human dental calculus of the Early and Middle Neolithic Sudanese cemeteries of Ghaba in the Shendi Reach and at R12 in the Dongola reach in Northern Sudan, provide evidence of wheat and barley. This evidence suggests that these domesticated taxa were introduced into Africa in the early Neolithic. The pillow-like grave deposits provide information about the role of plants in the burial ceremony, at site 8-B-52-A in Sai Island, the site that dates

13 Zohary and Hopf, *Domestications of Plants in the Old World,* p. 13.

to the pre-Kerma period.[14] They were also found at the pharaonic town at Amara West, which dates to 1250-1070 BCE.[15] Remains of *Triticum diococcum* have been reported at the Napatan site HP736 in the Wadi Umm Rahau at the Fourth Nile Cataract, in the Egyptian and Napatan site in Kawa, and from the same period outside the Nile Valley, at Gala Abu Ahmad, located about 110 kilometers west of the river in Wadi Howar, Meroe.[16] These remains have also been found at Christian sites such as Soba (Cartwright 1998; Van der Veen 1991), Nauri (Fuller and Edwards 2001), El Hamra (Madani et al 2015), El Mireibiet (Hamdeen et al 2018), and Banganarti (Hamdeen and Pokorny 2022). This domesticated cereal constitutes the main source of calories for mankind. Cereals thrive in open ground and complete their life cycle in less than a year. The nutritional value of their grains generally is high, and the seeds can be stored for long periods. These two cereals remain common crops in northern Sudan today. They provide important proteins for both people and animals.

Other cereal remains can be found in this material. For example, *Sorghum bicolor* is present in seed form from sites TMB016 and DFF009. This plant is considered one of the world's five most important cereals, but its origins are less well understood than the others (namely rice, wheat, barley, maize).[17] Sorghum is especially important in the semiarid tropics of Africa and South Asia, with significant production also in China, Southeast Asia, and the Americas.[18] There is clear evidence for the use of wild sorghum in the eastern Sahara as early as 6000 BCE and by Neolithic populations in Central Sudan by the fourth millennium BCE.[19] Evidence for the transition from wild sorghum to domesticated sorghum can be sequenced in the stratigraphy of Qasr Ibrim. It suggests that domestication may have been as late as the first centuries CE.[20] Research from Eastern Sudan indicates sorghum was domesticated in the Fourth Millennium BC, based on spikelet morphology from the ceramic impression of the Butana Group (site KG 23) near Khashim el Girba.[21]

14 On the use of plants during the burial ceremony, see Out et al., "Plant Exploitation in Neolithic Sudan"; On the dating of the site, see Geus, "Two Seasons in Sai Island."

15 Ryan et al., "Archaeobotanical Research in a Pharaonic Town in Ancient Nubia."

16 On the Napatan site HP736 in the Wadi Umm Rahau at the Fourth Nile Cataract, see Badura, "Plant Remains from the Napatan Settlement in Wadi Umm-Rahau." On the Egyptian and Napatan site in Kawa, see Fuller, "Early Kushite Agriculture." On Gala Abu Ahmed, see Kahlheber, "Archaeobotanical Investigations at the Gala Abu Ahmed Fortress in Lower Wadi Howar, Northern Sudan." On Meroe, see Shinnie and Anderson, *The Capital of Kush 2*, p. 366.

17 Fuller et al., 2014.

18 Doggett, *Sorghum;* Hulse et al., *Sorghum and Millets;* Snowden, *The Cultivated Races of Sorghum.*

19 On the Eastern Sahara, see Wasylikowa et al, 1999. On Central Sudan, see Stemler, "A Scanning Electron Microscopic Analysis of Plant Impressions in Pottery."

20 Rowley-Conwy, "Sorghum from Qasr Ibrim"; Rowley-Conwy et al., "Ancient DNA from Archaeological Sorghum (Sorghum bicolour) from Qasr Ibrim."

21 Winchell et al., "Evidence for Sorghum Domestication in Fourth Millennium BC Eastern Sudan."

The last species of cereal type, *Setaria italica,* was reported as seeds from two sites, MAS021 and DFF009. One of the pieces of evidence in the area for this *Setaria* species was recovered from the settlement contexts at site known as Abu Darbien, which is located in Central Sudan and dates to 7860 cal. BP.[22] In the Eastern Sudan from sites K1 I 5, S14D, 3-S5 dated to Gash group 1500-1400 BCE. *Setaria* species was identified on the exterior surface of pottery and not far from that site. *Setaria* species also was recorded from site SEG 42 R 5 and dating to Hagiz Group 500 BCE-500 CE.[23] Some remains of *Setaria* species have been identified also in the organic residues in pots from early Meroitic cemetery at Amir Abdallah.[24] *Setaria italica* remains appeared together with a related wild weedy grass identified as *Setaria cf. sphaceleata* at the Christian site at Nauri on the opposite bank of the site DF009.[25] This evidence suggests that *Setaria* species is common in this area of Sudan and that there may be some connection between these two sites during Christian period.

The evidence of domesticated plants from our sites in the Third Cataract provided a strong indication of the agricultural production of these crops during the Early, Classic, and Late Christian period. The evidence of Nubia therefore suggests that the original agriculture in Nubia focused on winter cultivation based on receding Nile floods. The summer season of low flood would not have been conducive to cultivation without irrigation, except over very limited land areas or of very tolerant crops.[26] But all this was changed when the *sāgiya* was introduced to Sudan during the Meroitic period.[27] More land was made available and more crops could be produced. This development has important implications for the potential density of the population, as more land will require more labor, and two seasons "winter and summer" of cultivation will tie laborers to the land for a greater proportion of the year, thus potentially removing some of their ability to be part-time specialists during the non-agricultural seasons as potters.[28] This was confirmed by the high density of pottery sherds, kilns, and several houses noted and documented on the Christian sites in the Third Cataract and Dongola region.

The evidence of these cereals from the mud-building sites in the Third Cataract indicates that these plants played a major role in the economy and foods for humans and animals during the Christian

22 Magid, "Exploitation of Plants in the Eastern Sahel (Sudan)."
23 Beldados, "Millets in Eastern Sudan," pp. 507, 509.
24 Fernandez, *La Cultura Alto-Meroitica del Norte de Nubia.*
25 Fuller and Edwards, "Medieval Plant Economy in Middle Nubia."
26 Fuller, "The Economic Basis of the Qustul Splinter State."
27 Adams, *Nubia: Corridor to African;* Trigger, *History and Settlement in Lower Nubia.*
28 Fuller, "The Economic Basis of the Qustul Splinter State."

period (6th to the 16th centuries CE) in the Third Cataract region and in Northern Sudan. This suggestion can be confirmed by historical texts dating to this same period and other plant remains from Christian sites in Northern and Central Sudan.[29]

*Riverine wild flora*

The material under discussion also contained wild plant species, a few of which have medical and ethnographic value. These plants were probably collected by or available for this purpose to people living in the Christian settlements in the Third Cataract region. One of these riverine wild floras is *Cyperus rotundus*, a type of grass that appeared from the complete purple nutsedge roots from site TMB016, DFF008 and DFF009. This species has been in association with humans from remote pre-history to the present. It was consumed as a food for thousands of years in prehistoric times, but is viewed as a troublesome weed in modern times. Abundant remains of *C. rotundus* tuber, thought to have been collected as food, were found at the 18,000-year-old site of Wadi Kubbaniya, near Aswan, Egypt, and at later sites at Al Khiday, 25 kilometers south of Omdurman.[30] The complex of burial sites has yielded dental calculus samples from pre-Mesolithic, Mesolithic Neolithic, and Late Meroitic ages, covering more than 7000 years. Cyperaceae tuber was recorded from the Kushite site at Kawa dating back to the Napatan period (750-400 BCE).[31]

Ecologically, *Cyperus rotundus* is commonly found in cultivated areas, disturbed areas, roadsides, lawns, parks, and wastelands, and is favored by moist, fertile soil conditions, and a warm climate.[32] Moisture and temperature are reported to be the most important factors in restricting its possible distribution in agroecosystems.[33] Plants of *C. rotundus* continuously produce new tubers and successive plants until the occurrence of frost over winter, which burns the leaves and causes the tubers to enter into a state of dormancy. *Cyperus rotundus* tubers are sensitive to saline conditions, low temperatures, and shade.[34] The extraction of chemical compounds and microfossils from dental calculus derived from prehistoric skeletons from the site of Al Khiday indicates that the tubers of *C. rotundus* were used as food and may have served as a carbohydrate staple for millennia. The evidence of this plant in the Third Cataract indicates that the plants

29 On the historical texts, see Vantini, *Oriental Sources Concerning Nubia.*

30 Wadi Kubbaniya, near Aswan, Egypt, see Hardy and Kubiak-Martens, *Wild Harvest.*

31 On the complex of burial sites, see Buckley et al., "Dental Calculus." On Kawa, see Fuller, "Early Kushite Agriculture," p. 71.

32 Auld and Medd 1987; Parsons and Cuthbertson 2001.

33 Bendixen and Nandihalli, "Worldwide Distribution of Purple and Yellow Nutsedge."

34 Gunasekera and Fernando, "Agricultural Importance, Biology, Control and Utilization Cyperus rotundus."

may have been used as food or a part of local traditional perfume made by a woman in Sudan called *(khunfur)*.[35]

Large deposits belong to glumes of wild grasses (family: *Poaceae*) were presented in the samples from the four sites, but the species remains unidentified. Generally, grasses have a high nutritional value, and they have been collected for animal fodder or a part of the clay and probably mixed with clay during the production of the mudbrick.

*Wild trees*

The remains of *Adansonia digitate* appear from small fragments of the fruit pulp in sites TMB 016 and MAS 021. The ecological conditions of this plant lead it to mainly grow in the hot and dry savanna areas of sub-Saharan Africa. The plant is very effective in preventing water loss and can flourish in sandy soils. In East Africa, the trees grow in the shrublands and coastal areas. *Adansonia digitata* is a traditional food plant in East and sub-Saharan Africa. It has a rich medicinal and nutritional value, this species was indigenous to West Africa and brought to Eastern Africa by a movement of pastoralists.[36] In the arid and semi-arid areas of sub-Saharan Africa, the *Adansonia digitata* provides a variety of foodstuffs to local communities, as well as fodder, fibers for weaving and rope-making, gum, seed oil, natural medicine, materials for dishes, and water storage.[37] It can also be used for shelter and as a gathering point for humans and their livestock.[38] All across the African continent, the sight of *Adansonia digitata* has inspired tales, poetry, songs, and legends. *Adansonia digitata* have often commanded compassion and even devotion.[39]

The earliest archaeobotanical record from Sudan and northeast Africa for this species came from site K1 IX in Kassala and dates to the Late Gash Group context. This evidence was the charred seeds of *Adansonia digitata.* These findings suggest that this tree had already

35 Buckley et al., "Dental Calculus"; Hamdeen, "Preliminary Observation on the Plant Remains."

36 On the medicinal and nutritional values, see Andrews, *The Flowering Plants of the Anglo-Egyptian Sudan;* Mabberley, *A Portable Dictionary of Plants.* On importation by pastorialists, see Pock Tsy et al., "Chloroplast DNA Phylogeography."

37 On foodstuffs to local communities, see Van Wyk, *Food Plants of the World;* Kabore et al., "A Review of Baobab (*Adansonia digitata*) Products." On fodder, see Venter and Venter, *Making the Most of Indigenous Trees;* De Caluwe, *Market Chain Analysis of Baobab;* Bekele-Tesemma, *Useful Trees and Shrubs of Ethiopia.* On fibers for weaving and rope-making, see Teel and Hirst, *A pocket directory of trees and seeds in Kenya.* On gum, see Roberts, *Indigenous healing plants;* Nussinovitch, *Plant Gum Exudates of the World.* On seed oil, see Osman, "Chemical and Nutrient Analysis of Baobab"; Kamatou et al., "An Updated Review of Adansonia Digitata." On natural medicine, see Mueller and Mechler, *Medicinal Plants in Tropical Countries;* Iwu, *Handbook of African Medicinal Plants;* Lim, *Edible Medicinal and Non-Medicinal Plants.* On materials for dishes, see Schütt and Wolf, "Adansonia Digitata." On water storage, see Walsh, "Climate, Hydrology, and Water Resources."

38 Gebauer and Ebert, "Tropische Wildobstarten."

39 Buthelezi, *Baobab;* Wenkel, *Im Schatten des Baobabs.*

been transferred from west to east across the savanna by the early second millennium BCE.[40] The evidence from the Third Cataract is considered the second record for this species in the Sudan and North-East Africa dating back to the early Christian period (sixth century CE).

The *Acacia nilotica* belongs to the family Fabaceae. It is a widely spread tree in the central and northern parts of the Sudan, known in Sudanese folk medicine as *kārad*.[41] The species of Acacia is found all over the world distributed in dry tropical and sub-tropical regions. In Sudanese folk medicine, the fruits (pods) of *Acacia nilotica* are used as aqueous macerates or in a powder form for the treatment of pneumonia, tonsillitis, dysentery, diarrhea, and malaria.[42] The phytochemical studies on the pods of *Acacia nilotica* showed some bioactive principles such as tannins, saponins, glycosides, and flavonoids.[43] Some studies showed that the pods of *Acacia nilotica* have potential antioxidants and are found effective in protecting plasmid DNA and human serum albumin protein oxidation induced by hydroxyl radicals.[44] It can be also used as fodder for livestock in the dry lands of Sudan.[45] The *Acacia sp*. remains were recorded from many archaeological sites in this region such as at Kawa, Nauri, and Banganarti.[46] In the samples from the study area the evidence of *Acacia nilotica* is represented on the form of seeds. Some tree bark probably related to *Acacia sp.* were also reported. This plant had medical uses in Sudan, but the archaeological evidence for plants employed for medicinal purposes in Sudan is not clear. However, physical anthropological analysis of human bones shows many diseases during the Christian period, and according to ethnobotanical and laboratory studies, some of these diseases could be cured by certain plant species.[47] Depending on the field observation, it is likely that this plant was used for the medical value, animal fodder, fire fuel and using for building houses and animal stockyard in the Third Cataract region.

Lastly, the archaeobotanical evidence from the Christian mudbrick sites in the El Mahas region provided some evidence of the flora landscape. t can be divided into three types: riverine wild flora, cultivated flora, and wild trees. It offers also a new

40 Beldados, "Millets in Eastern Sudan."
41 Abd-El-Nabi et al., "Antimicrobial Activity of *Acacia nilotica*."
42 Ebrahim et al., "Study on Selected Trace Elements and Heavy Metals in Some Popular Medicinal Plants from Sudan."
43 Auwal et al., "Antibacterial Properties."
44 Singh et al., "Antioxidant and Anti-Quorum Sensing Activities."
45 Abdalla et al., "Fodder Potential."
46 On Kawa, see Fuller, "Early Kushite Agriculture," p. 71. On Nauri, see Fuller and Edwards, "Medieval Plant Economy in Middle Nubia," p. 99. On Banganarti, see Hamdeen and Pokorny, "Plant Impressions," p. 208.
47 Hamdeen and Pokorny, "Plant Impressions."

perspective for applying the technique of extorted plants remains from mudbrick in Sudan and how the characteristics of mudbrick offer good conditions for preserving organic remains. Some of the plant remains are still undetermined, including some fragments of branches, charcoal, and wood. Further palynological, carpological, and xylological analyses studies in the future should provide a new data relating to the domestication and natural vegetation of the area.

## Conclusions

The plant remains that were reported from the four Christian sites in the Third Cataract region provide to us some information about the homescape and landscape of this area. Evidences of *Triticum aestivum, Hordeum vulgare, Sorghum bicolor,* and *Setaria italica* show that they were probably used as some of the primary sources of foodstuff for human and animal populations during the Christian period. Many cereals, legumes, roots and tubers, fruits, nuts, and leaves belonging to those species provided valuable and fundamental diets for consumption to human foods and fodder for animals.

Our plant remains provided some evidence of the external and internal homescape of the Third Cataract during the Christian period. *Acacia* species and *Adansonia* species could be used as building materials in both the exterior and interior shelters and homes. Some of these materials are wood, timber, and straw, as well as hard trunks and tree branches probably used as roofs and walls in the houses. Furniture was commonly composed of *Acacia* woods.

From ancient times till nowadays, people used traditional herbal medicines to treat their ailments; particularly in our materials *Acacia nilotica* was presented and probably used for medical purposes. The remains of the *Adansonia digitata* from the Third Cataract was probably used in a variety of ways during the Christian period for water storage, medical needs, and shelter as well. Today Sudanese women employ *Cyperus rotundus* for cosmetic and perfumery purposes, and it may have been used during the Christian period also.

There are three flora landscapes in the area of study based on our plant remains, cultivated flora which include the four cereals; *Triticum aestivum, Hordeum vulgare, Sorghum bicolor,* and *Setaria italica.* Riverine wild flora which can noted clearly form the remains of *Cyperus rotundus* and some wild grasses, and lastly *Acacia nilotica and Adansonia digitata,* which can be considered as two models representing wild trees in the Third Cataract region during the Christian period.

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