

ISTITUTO PER L'ORIENTE "C.A. NALLINO"
UNIVERSITÀ DEGLI STUDI DI NAPOLI "L'ORIENTALE"

RASSEGNA DI STUDI ETIOPICI

Vol. 5

3^a Serie

(LII)



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Cover image: Pottery cup decorated with painted frogs and lotus flowers. Detail. Faras (Sudan), 1st–2nd cent. AD. British Museum EA 51448.

CEREAL EARS ON AKSUMITE COINS: REFLECTIONS BETWEEN NUMISMATICS AND ARCHAEOBOTANY*

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Abstract

Investigation of ears of cereals depicted on some Aksumite coins was conducted with the aim of identifying the species of the plants represented. A synthesis of this topic both in historical and numismatic studies and in archaeological and archaeobotanical research is given and an alternative view regarding past proposed identifications is discussed. Considering that both exogenous and endogenous influences converge in Aksumite coinage, it is proposed to include in the latter also the ears of cereals which could be identified as certain Ethiopian landraces of tetraploid free-threshing wheats that may have been cultivated during the Aksumite period.

The importance of the cereal cultivation and rich plant biodiversity of the Ethio-Eritrean Highland, both now and in the past, is highlighted. This had been underlined by the Russian botanist Vavilov who included this area among what he called the primary centres of origin of the tetraploid wheats. Furthermore, the importance of cereal cultivation in this region during the past is attested both by the already known Ethio-Eritrean archaeobotanical record, which is summarized here, and by new archaeobotanical investigations carried out in the Eritrean coastal site of Adulis.

Keywords

Aksumite coins – wheat – barley – Ethio-Eritrean agriculture – Adulis

* I would like to thank Andrea Manzo for inspiring me to write this paper and for introducing me to the world of Aksumite coinage. I would also like to thank Gianfrancesco Lusini for inviting me to attend the workshop “Giornate di studi eritrei ed etiopici in memoria di Carlo Conti Rossini (1872-1949)” where I presented this work. I wish to thank Michael DiBlasi, Luisa Sernicola, and Chiara Zazzaro for having provided useful reference books and papers, and Jim Bishop for the translation and advice. A special thank-you to Lorenzo Costantini for fruitful conversations regarding some of the topics of this paper and for his careful proofreading of the manuscript. I am grateful to an anonymous referee who kindly provided constructive comments and detailed suggestion on an earlier version of the manuscript.

Introduction

The existence of mostly “medieval” literary sources from the kingdom of Aksum, and the fact that the realm is variously mentioned in written documents of contemporary Mediterranean and South Arabian Classical civilizations, has led several authors to equate this ancient kingdom with a protohistoric-type society that had a tribal organization (Munro-Hay 1991; Pedroni 1997: 7, 75). However, two features were present that would be rather unusual for a society of this type, namely a conspicuous quantity of inscriptions and a similarly abundant coinage that starts at the end of the 3rd century AD.

Over the years Aksumite coinage has been the focus of numerous studies (in particular: Anzani 1926, 1928–1929, 1941; Conti Rossini 1927, 1928; Pankhurst 1975, 1979, 1986; Munro-Hay 1978, 1984, 1986, 1989, 1990, 1991, 1999; Munro-Hay, Juel-Jensen 1995; Hahn 1983, 2000; Hahn, West 2016; Godet 1986, 1991; Pedroni 1997; Bausi 2003), in the course of which at least passing attention has been given to the plants it portrays, especially the cereal ears shown on numerous coins of diverse fabrication and chronology. These cereal ears have been considered from various viewpoints, by historians and numismatists, and also by archaeologists and archaeobotanists. In this paper we will try to outline the different interpretations put forward in a number of studies of Aksumite coinage, making additional observations useful for a new definition of these plant items that are variously depicted on diverse coins issued by the kingdom of Aksum, from the earliest to the latest.

In recent years, moreover, this evidence has been increasingly viewed in the light of the archaeobotanical data that are increasingly expanding our knowledge of the agriculture practised on the Ethio-Eritrean plateau in the first millennium BC and the first millennium AD (D’Andrea, Richards, Pavlish, *et al.* 2011). In truth, this combined study approach has been little used in the investigation of coins from other better known ancient cultures, such as the Graeco-Roman civilization. Only quite recently has it been employed, for example, as a useful means of understanding the main aspects of the Magna Graecian agriculture on the Metapontine plain and to throw light on ancient symbolism (Costantini, Biasini Costantini 2003, 2018). A general account of the exploitation of cereals and other plants during the pre-Aksumite and Aksumite periods based on archaeobotanical analyses carried out in the past –

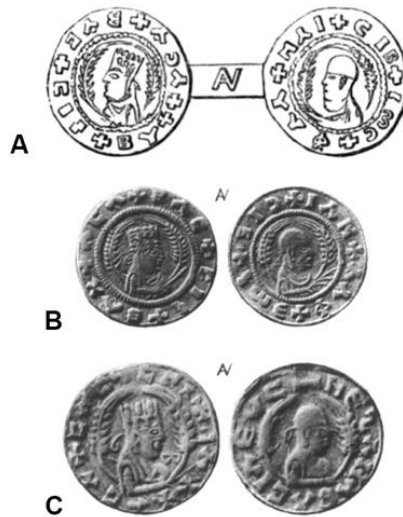


Fig. 1. Investigations into cereal ears during the 19th century.

A. Gold coin of king Esahel studied by E. Rüppel (1846).

B. Gold coin attributed to king Bakhasa by Prideaux (1884, pl. X, no. 3).

C. Gold coin attributed to Ezanas by Prideaux (Prideaux 1884, pl. X, no. 10).

together with the presentation of recent archaeobotanical data – will furnish additional elements on which a new interpretation of cereal ear depictions on the coins of the kingdom of Aksum may be based.

Interpretation of cereal ears in historical-numismatic studies

In one of the first published notes describing the coins from the kingdom of Aksum (Rüppel 1846), generic reference is made to the cereal ears represented on the coins, without attempts at more precise identification (Fig. 1A). Later though, Prideaux described as a common feature of the gold coins – in both pagan and Christian periods – the presence on the obverse of ears of barley, placed so as to enclose the busts of kings facing to the right (Figs 1B, 1C). Furthermore, the same author reports that on the reverse, the king's image is often again shown in right profile, always bracketed between two ears of barley (Prideaux 1884: 207). Similarly, Head in his weighty *Historia Numorum* identifies as barley the ears present on Aksumite coins (Head 1887: 725).

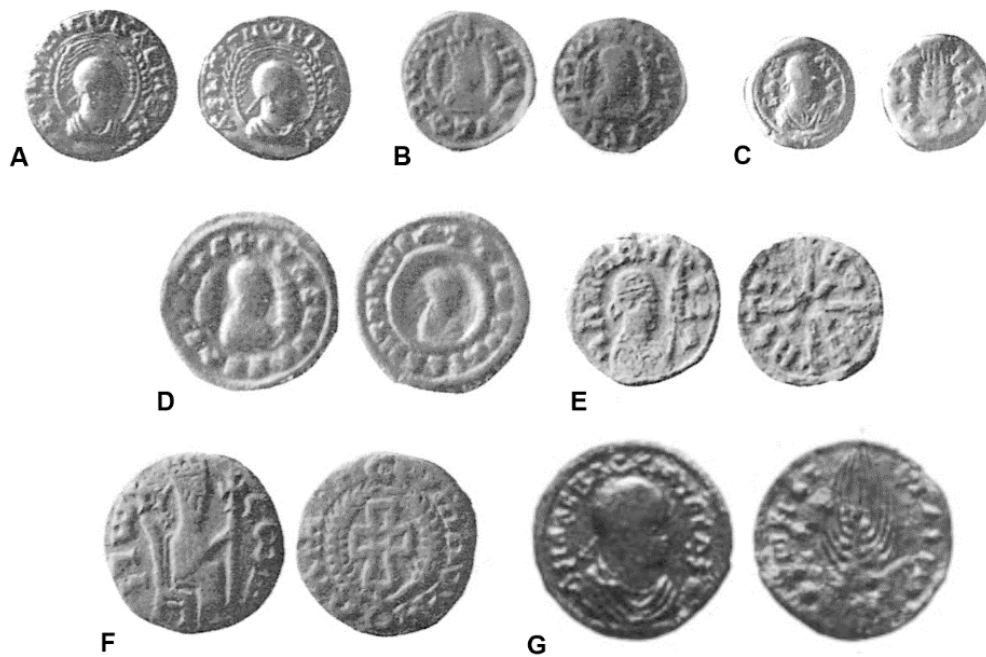


Fig. 2. Investigations into cereal ears by A. Anzani e C. Conti Rossini during the early 20th century.

A. Gold coin of Endybis, pagan era (from Anzani 1926, tav. A., no. 3). B. Gold coin Joel Christian era (from Anzani 1926: tav. G, no. 198). C. Copper coin of Ezanas (from Anzani 1926: tav. B, no. 30). D. Copper coin of Ouazebas (from Anzani 1926: tav. C, no. 71). E. Copper coin of Wazena (from Anzani 1926: tav. I, no. 253). F. Copper coin of Armah (from Anzani 1926: tav. I, no. 261). G. Copper coin of Aphilas (from Conti Rossini 1927: 188).

The historian and numismatist Anzani (1926), in the catalogue of his own coin collection and of other private and public Aksumite collections – including the coins found during the 1906–1907 excavations of R. Paribeni and F. Gallina in Adulis, in Eritrea – places some emphasis on the different arrangement and kinds of cereal ears present, distinguishing them by date and coin type. In particular, he notes that the ears encircle the busts present on both the obverse and reverse of gold coins, in the both pre-Christian and Christian periods. The stem of one of these ears is generally held in the right hand of the figure represented (Anzani 1926: 19–21). Anzani suggests that the cereal ear might have had the significance of a heraldic sign, although he does not assign particular importance to cereal production in the Aksumite realm. Cereal ears are almost always present on the gold coins; earlier on they are large and well-finished, then become progressively smaller, until in the reign of Joel they

take the form of two palmettes placed vertically beside the busts, which are much reduced in size as well (Figs 2A, 2B). Anzani also notes the lack of cereal ears on silver coins and their scarcity on those defined by the author as being of copper, on which ears feature as the main design on the reverse of some coins of Ezanas (Fig. 2C) and Aphilas, around the image of Ouazebas on the obverse (Fig. 2D), held like a sceptre by Wazena on the obverse (Fig. 2E), around the cross on the reverse of coins of Armaḥ (Fig. 2F), and around the profile of Ḥatāz I (Anzani 1926: 24). However, this interest is not accompanied by the identification of the species of these cereals. The approach of Kammerer is similar, and neither he names the types of cereal represented on the coins studied (Kammerer 1926: 139).

Conti Rossini describes a “copper” coin of Aphilas with a single design featuring on the reverse an “ear of wheat, or rather barley, the most widespread cereal in Abyssinia” (Conti Rossini 1927: 180). The ear is described as being “quite plump with a large tuft” (Fig. 2G) (Conti Rossini 1927: 188).

In a critical reference to this description by Conti Rossini, Anzani remarks that the cereal ear was an important emblem on Aksumite coinage (Anzani 1928–1929: 11). He had conducted a new study of the occurrence of stylized depictions of ears on the reverse of bronze coins of Aphilas and Ezanas, and framing the busts on the obverse and reverse of some gold and bronze coins. Anzani observes that these ears have “beards”, that is awns (bristles), that tended to curve and converge towards the top, and associates this feature with wheat awns. He points out that in contrast, awned barley varieties possess straight or divergent bristles, as they appear in the ears depicted on the Greek coins of Metapontium. In support of this identification, Anzani refers to the studies of the Russian agronomist Vavilov (1926, 1951) into the localities of origin of the cultivated plants, citing that the work indicates Ethiopia as one of the centres of domestication of durum wheat. He also remarks that in Ethiopia there was still, in the 1920s, a species of black wheat not known in other parts of the world.

The wider-ranging studies of Munro-Hay (1978: 43–47; 1984) also make reference to species-level identification of the ears represented on the coins. The cereal ears present on most of the coins of both the pagan and Christian periods, enclosing the busts depicted on the obverse and often also on the re-



Fig. 3. Investigations into cereal ears during the late 20th century.

A-F. Coins with ears identified as primitive two-rowed barley (*Hordeum vulgare* L. subsp. *distichum*). A. An example of ears encircling the busts present on both the obverse and reverse of a gold coin of Endybis (from Munro-Hay 1978: 43, Endybis AV1). B-C. A single ear on the reverse of two copper coins of Aphilas (from Munro-Hay 1984: 54, Aphilas AE.2; from Munro-Hay, Juel-Jensen 1995: 95–96, Aphilas, Copper type 13, JJ193). D. A single ear on the reverse of a copper coin of Ezanas (from Munro-Hay 1978: 261, Ezanas pagan AE2). E. A single ear on the reverse of a copper coin of Ezanas (from Munro-Hay, Juel-Jensen 1995: 126, Ezanas, Copper type 41, JJ90). F. Gold coins of Ezanas (from Munro-Hay 1986: 23, Ezanas, AV.1b, MH.37).

G. Ear of two-rowed barley (*Hordeum vulgare* L. subsp. *distichum*) (from Neef, Cappers, Bekker 2012: 375).

verse, are identified in fact mainly as two-rowed barley (Figs 3A, 3G). A single ear is also to be seen on the reverse of some copper coins of Aphilas (Munro-Hay 1984: 54, Aphilas AE.2; Munro-Hay, Juel-Jensen 1995: 95–96, Aphilas, Copper type 13, JJ193) (Figs 3B, 3C) and of Ezanas (Munro-Hay 1978: 261, Ezanas pagan AE2; Munro-Hay, Juel-Jensen 1995: 126, Ezanas, Copper type 41, JJ90) (Figs 3D, 3E). Munro-Hay remarks that the representation of cereal ears is typical of Aksumite coinage, remaining unchanged until the advent of Christianity, so much so that they may be considered a probable symbol of the kingdom (Munro-Hay 1978: 43). In the same work Munro-Hay identifies ears around the bust of the kings Kaleb, Ousanas, Ouazebas and Mehadeyos (MHDYS) as wheat, without providing further information about any differences among these depictions (Munro-Hay 1978: 73, 126).

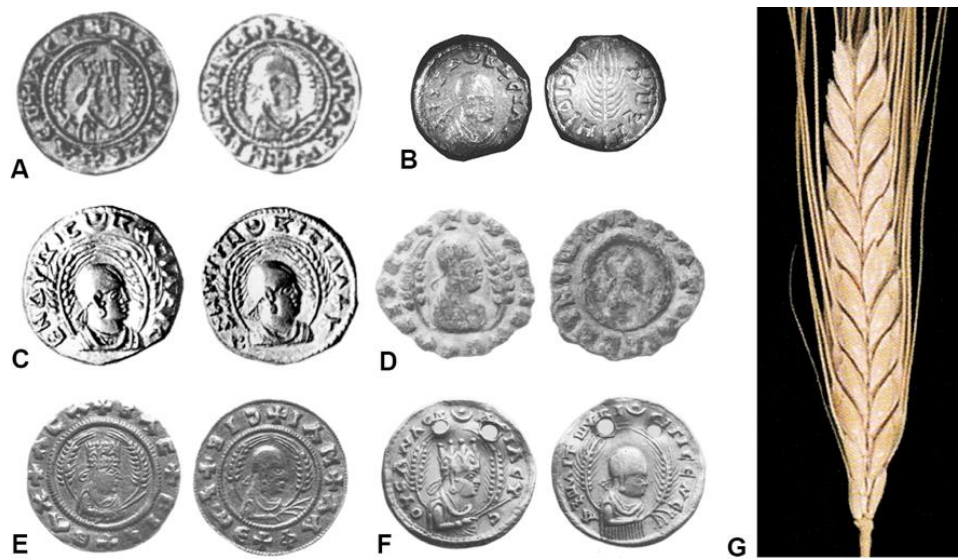


Fig. 4. Investigations into cereal ears during the late 20th and early 21th century.

A-B Coins with ears identified as barley, *Hordeum vulgare* L. subsp. *distichum*, or wheat, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell.

A. Gold coins of Ezanas (from Munro-Hay 1989: 88, Ezanas, AV1, al-M.2).

B. Silver coin of Aphilas (from Munro-Hay 1990: 238, pl. 23B).

C-F. Coins with ears identified as wheat, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell. C. Gold coin of Endybis (from Munro-Hay; Juel-Jensen 1995: 79, AV1, JJ13).

D. Bronze coin of Ouazebas (from Munro-Hay 1999: pl. 26, cat. no. 280). E. Gold coin of Eon (from Munro-Hay 1999: pl. 27, cat. no. 290). F. Gold coin of Ousanas (from Hahn, West 2016: 42, cat. no. 53, JJ403).

G. Ear of emmer, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell. (from Zohary, Hopf, Weiss 2012: pl. 4).

It should also be borne in mind that in later works the same author identifies ears both placed behind the royal bust and depicted as the main design on the same and other coin types, first again as barley (Munro-Hay 1986: 19, copper coin of Ousanas, AE.2, MH.25a; Id. 1986: 23, gold coin of Ezanas, AV.1b, MH.37) (Fig. 3F), then as barley or wheat (Munro-Hay 1989: 88, gold coin of Ezanas, AV1, al-M.2; Id. 1990: 238, silver coin of Aphilas, pl. 23B; Id. 1991: 169, 185–86) (Figs 4A, 4B, 4G), and lastly as wheat (Munro-Hay, Juel-Jensen 1995: 39 and e.g. 79, gold coin of Endybis, AV1, JJ13; Munro-Hay 1999: 34, bronze coin of Ouazebas, pl. 26, cat. no. 280; Id. 1999: 35, gold coin of Eon, pl. 27, cat. no. 290), similarly to recent interpretation of other authors (Hahn, West 2016, e.g. 42, gold coin of Ousanas, cat. no. 53, JJ403) (Figs 4C-4F).

Munro-Hay (1991: 169–70) relates that Vavilov in his study of the cultivation of wheat in Abyssinia identified ears depicted on two coins described as “Abyssinian” as *Triticum turgidum* subsp. *abyssinicum* Vav. (Vavilov 1931: 10, fig. 4), mentioning however that the coins studied by Vavilov were not Aksumite, but bronze issues of early to mid 1st century Judaea. Vavilov (*ibid.*) reports that these coins were collected during an expedition carried out in Abyssinia, but Munro-Hay (1991: 170) claims that such coins have not ever been found in Ethiopia.

Finally, according to Hahn (1999; 2000: 289, 301; 2003: 768) in the pre-Christian period ears of corn recall the earth deity or, namely with crescents and stars also depicted on coins, stand for the celestial triad. These and other elements were afterwards retained and reinterpreted during the Christian period. This author thus considers cereal ears depicted on Aksumite coins as useful elements for the reconstruction of the religious history of Ethiopia in Late Antiquity, and furthermore relates the religious symbolism of these depictions, together with others, to the kingdom’s rulers need for divine legitimation.

These matters have thus aroused a certain interest among historians and numismatists, since the first studies were made of Aksumite coinage in the 19th century and in the early 20th century. However, it was never mentioned in these works, maybe rightly, that the representation of cereal ears on Aksumite coins might be considered a sort of imitation of that which was variously attested also in different periods of Roman coinage. This eventuality would be anyway compatible with the proposal that a propaganda project underlay the initiation of Aksumite gold coinage, which could have served primarily to place the kingdom of Aksum on a par with the major powers of the time (Pedroni 1997; Bausi 2003). Furthermore, it should also be borne in mind that the use of Greek for the first inscriptions, and the adoption of the weight-standard of the gold coins based on that prevailing in the Roman Empire, indicate that the coinage was intended to facilitate long-distance trade (Phillipson 2004).

Interpretation of cereal ears in archaeological studies

Only in recent decades – with the start of what may be considered the mature phase of the archaeological investigations in Ethiopia (Fattovich 1991;

Fattovich 1992: 54–55) – archaeologists and archaeobotanists have begun to consider and analyse the depictions of cereal ears on coins, in order to obtain information pertinent to an understanding of the history of Aksumite agriculture. One of the first was Phillipson (Phillipson 1993: 355) who – in a work on the antiquity of cultivation and pastoralism in Ethiopia which incorporated data from archaeology, archaeobotany, linguistics, and the study of inscriptions and rock art – placed a certain importance on the depictions of cereal ears for the reconstruction of the history of bread in ancient Ethiopia. Phillipson recounts the different identifications of the ears made by various numismatists and historians, and identifies as emmer, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell.¹ the ears on some coins in the British Museum collection examined by him (Phillipson 1993: 354–55). In Phillipson’s judgement, “the repeated representation of paired grains, of long terminal whiskers and short lateral ones, leaves little doubt that emmer wheat is depicted”. So Phillipson may be considered the first scholar to report a rather detailed reading of the depiction of cereal ears on Aksumite coins, referring, however briefly, to the morphology of the cereal ears (Figs 5–6) depicted on the gold coins of Endybis and Ebana and the bronze coins of Ouazebas and Armaḥ.

Later Bard (1997: 23), relating that the ears on Aksumite coins have been variously identified as wheat or barley, repeated the observations made by Ruth Plant, an expert on Ethiopian rock-cut churches (Munro-Hay 1991: 169). During her countless travels in Ethiopia, Plant had noticed that the distribution of the areas where wheat and barley grew and that of Aksumite sites coincided. Various subsequent publications (Boardman 1999: 140; Bard, Coltorti, Di Blasi, *et al.* 2000: 77; D’Andrea, Haile 2002: 184) state that the importance of emmer in Aksum’s agriculture is spotlighted by this cereal’s widespread depiction on the coinage of the kingdom.

In a study of the Aksumite archaeobotanical record, D’Andrea, Richards, Pavlish, *et al.* (2011: 369) write that cereals from the Near East, such as wheat, seem to prevail. They suggest that wheat was probably one of the cereals preferred by the Aksumite elite, citing in support of this hypothesis the widespread presence on the kingdom’s coins of cereal ears identifiable as emmer encircling the images of kings, as already mentioned by Phillipson (1993: 354

¹ Botanical nomenclature follows Zohary, Hopf, Weiss (2012).

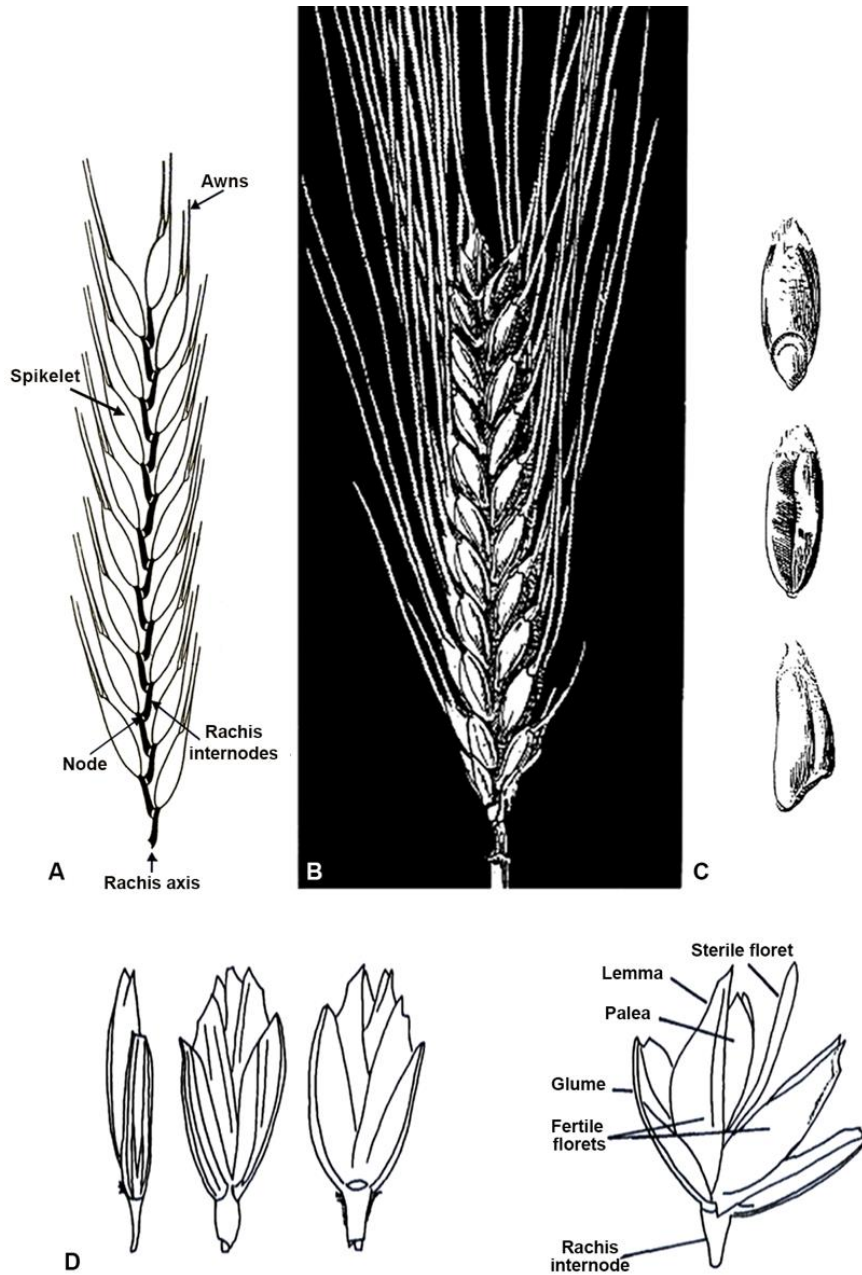


Fig. 5. Main parts of a cereal ear and main features of an emmer ear, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell.

A. Schematic line drawing of a cereal ear consisting of a rachis, the central axis, with attached spikelets, each with florets. The rachis consists of rachis segments - internodes. The ear is shown laterally with respect to the axis of the rachis (modified from Jacomet *et al.* 2006: 5). B-C. Ear and grains of emmer, a tetraploid hulled wheat. Grains are shown from above in dorsal, ventral, and lateral views (modified from Zohary, Hopf, Weiss 2012: fig. 4). D. An emmer spikelet in ventral, dorsal, lateral view, and opened up - from left to right (modified from Charles 1984: fig. 1).

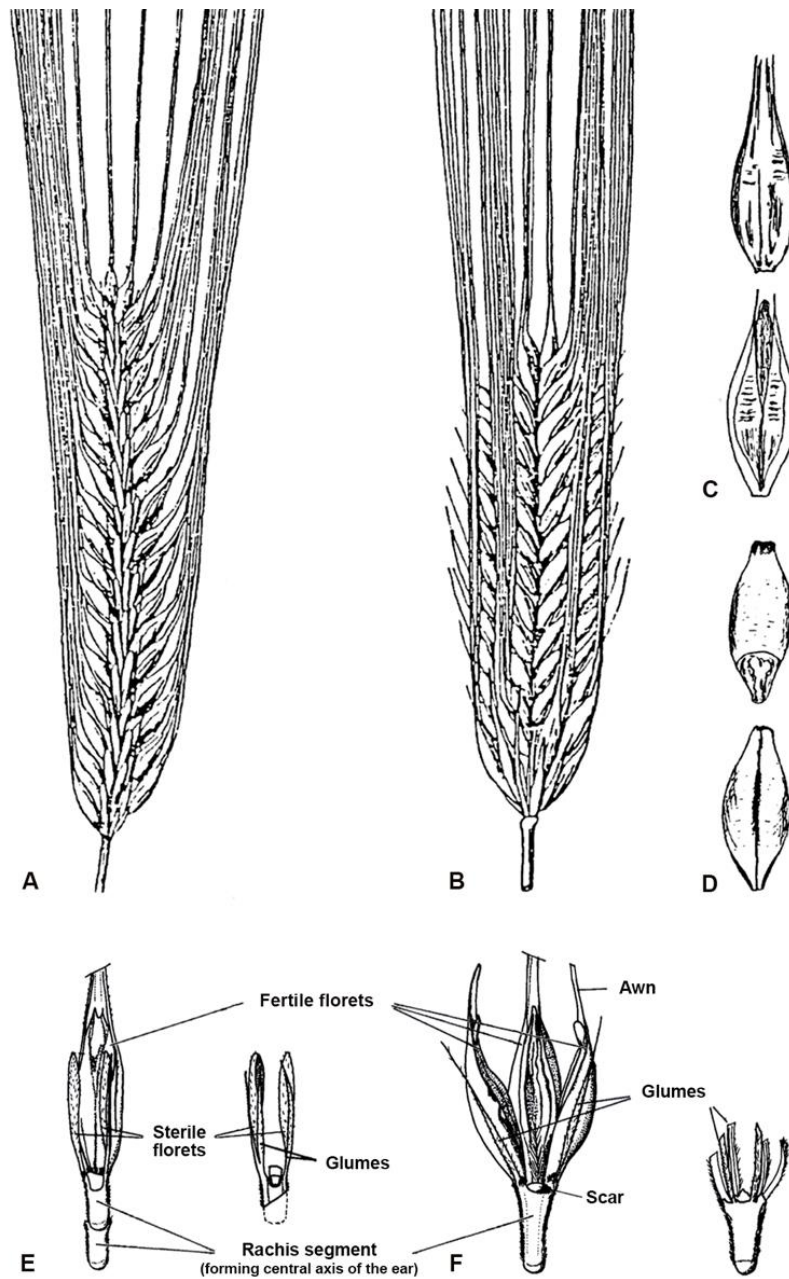


Fig. 6. Main features of barley (*Hordeum vulgare* L.).

A. Ear of domesticated two-rowed barley (*Hordeum vulgare* L. subsp. *distichum*).

B. Ear of domesticated six-rowed barley (*Hordeum vulgare* L. subsp. *vulgare*).

The ears are shown laterally with respect to the axis of the rachis.

C. Grains of hulled barley in dorsal and ventral views.

D. Grains of naked barley in dorsal and ventral views
(modified from Zohary, Hopf, Weiss 2012: fig. 15).

E. A two-rowed barley spikelet. F. A six-rowed barley spikelet
(modified from Charles 1984: fig. 5).

–55). D’Andrea, Richards, Pavlish, *et al.* (2011: 369) also remark that *tef* and other African cereals, even if consumed during the Aksumite period, are never represented in this way on its coins (Boardman 1999, 2000; D’Andrea, 2008).²

Beldados, in a paleoethnobotanical study of the site of Kassala (eastern Sudan), supported by ethnoarchaeological data from the same area and north-western Ethiopia, discusses the importance in Ethiopia of cereals coming from the Middle East, and underlines the constant presence of cereal ears on numerous coins from the reigns of various Aksumite kings (Beldados 2015: 9). The work includes a table of the names of kings who ruled in the kingdom of Aksum, the duration of their reign (when known), and the relative number of coins bearing the two cereal ears (here referred to generically as being of wheat) enclosing the royal busts.³

Thus, among archaeologists and archaeobotanists, a fairly unanimous opinion has prevailed over time that the ears represented on the coins of the realm of Aksum are of wheat, in particular emmer, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell.

New insights

Examination of some of the best published (mostly photographic) reproductions of Aksumite coins, usually of gold (Munro-Hay 1990, 1999; Pedroni 1997; Hahn, West 2016), has in some cases led to detailed perception of the morphological characteristics of the ears represented on them, allowing their comparison with different species of cereals.

For example, in the reproduction of the obverse of a gold coin of the Christian period monarch Kaleb, of probable early-6th-century date (Pedroni 1997: tav. 25, cat. no. 264), the king’s image is shown bracketed by two cereal ears.

² In this regard, it should be remembered that from Aphilas onwards, generally on the reverse of gold coins, the kings hold an object in their hands, probably a symbol of royalty: a rod from which hang smaller rods with pointed ends (Figs 4E, 4F, 6I, 7E). This item has been variously interpreted, e.g. as an artefact – a water sprinkler, fly-swat, scourge or flail – or as part of a plant – a palm frond, branch, leaves, or a sprig of olive or another plant bearing small fruit such as berries (Munro-Hay, Juel-Jensen 1995: 40; Munro-Hay 1978: 171–72 and references therein). Its possible resemblance to an ear of *tef*, however, has never been considered.

³ However, the bibliography consulted by the author for the compilation of this table is not given.

These feature two lateral rows of spikelets; another central row is partially visible on the left ear and less evident on the right, associated with other elements that look like awn-like (or tapering cylindrical) glumes. On the basis of these characteristics the ear may be identified as six-rowed barley (*Hordeum vulgare* L. subsp. *vulgare*), seen from the front of the rachis and distinguished by six or seven internodes. However, the fact that the spikelet rows clearly visible to the right and left of the rachis do not seem well aligned (as they should be in ears of barley seen frontally from the rachis) but instead bend slightly to enclose the king's bust, constitutes evidence against this interpretation. It should also be noted that the details seen on the obverse of this coin are not as legible on its reverse (Pedroni 1997: tav. 26, cat. no. 264), where again two ears enclose a bust. This latter representation is far more worn than that on the obverse (Figs 7A–7C). The ears on the back, in fact, seem more akin to those depicted on other gold coins of which large-scale reproductions are given in Pedroni's work. For example, similar ears are portrayed on both the obverse and reverse of other gold coins, both of king Endybis (e.g. Pedroni 1997: tavv. 1–2, cat. no. 1) who reigned at the end of the 3rd century AD, and of the following king Aphilas (e.g. Pedroni 1997: tavv. 5–6, cat. no. 22), of early-4th-century-AD date. These ears (which enclose the busts present on both obverse and reverse) are shown from the side of the rachis, and may be defined as semi-awned, since long bristles are present only in the upper half of the ear.⁴ They also have two rows of spikelets, with a clearly visible terminal spikelet that is positioned centrally with respect to the axis of the rachis. The spikelets are attached to fifteen or sixteen rachis internodes and feature grains that are mostly roundish in shape.

As mentioned above, this overall morphology has induced various authors to identify the ears as emmer, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell. (Figs 7D–7F).

However, emmer grains and therefore spikelets usually have a distinctive tapered shape, not the rounded shape usually shown by the spikelets depicted

⁴ The possible presence (or clear absence) of the lower spikelet awns, perhaps no longer discernible due to considerable wear of the coins, might be revealed by SEM examination of coins bearing ears. For definition of the degree of awning, besides other features, see Frattini, Valvassori (1976) and Hervey-Murray (1980).



Fig. 7. A, C. Gold coin of Kaleb (from Pedroni 1997: tavv. 25–26, cat. no. 264).
 B. Ear of domesticated six-rowed barley, *Hordeum vulgare* L. subsp. *vulgare*
 (from Neef, Cappers, Bekker 2012: 390).
 D, F. Gold coin of Endybis (from Pedroni 1997: tavv. 1–2, cat. no. 1).
 E. Ear of emmer, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell.
 (from Neef, Cappers, Bekker 2012: 461).
 G, J. Gold coin of Aphilas (from Pedroni 1997: tavv. 5–6, cat. no. 22).
 H–I. Ears of Ethiopian landraces of tetraploid free-threshing wheats. H. Ear of *Triticum*
turgidum abyssinicum var. *atromarginatum* (Chiov.) Vav. (from Ciferri 1943a: 258).
 I. Ear of *Triticum durum abyssinicum* var. *praesemiticum* Vav. (from Ciferri 1943b).

on Aksumite coins. In addition, the terminal spikelet of emmer ears frequently occupies a decentralized position with respect to the rachis axis – rather than being centrally placed, as shown on the coins of Endybis and Aphilas under consideration. These features – the terminal spikelet’s central position, and especially the rounded shape of the spikelets – indicate that the ears could belong, as well as to certain local accessions of emmer wheat with these characteristics (Ciferri 1943a: *T. dicoccum abyssinicum* var. *farrum* (Hochat) Stolet; Stoyanov 2014), also to some varieties of tetraploid free-threshing wheats (*Triticum turgidum* L.), such as turgidum wheat (*Triticum turgidum* L. subsp. *turgidum*) or some Ethiopian local variety (landrace) of tetraploid free-threshing wheats (Ciferri 1943a: 91; Percival 1921: 100–09, 147–346; Zohary, Hopf, Weiss 2012: 23–51). In Ethiopia, the isolation from wheat in other countries, the adoption of primitive agricultural systems, the presence of heterogeneous environments, and the occurrence of natural cross-fertilization due to field mixtures contributed to the tremendous wealth of morphogenetic diversity in the tetraploid wheats (Tesemma, Belay 1991: 52), already underlined, among others, by Vavilov (1926), Ciferri and Giglioli (1939), and Ciferri (1943a, 1943b, 1943c). Some of the ears of Ethiopian tetraploid free-threshing wheat illustrated in the works of Ciferri, such as *T. turgidum abyssinicum* var. *densoplanum* Vav. (Ciferri, Giglioli 1939: fig. 44; Ciferri 1943a: no. 165), *T. turgidum abyssinicum* var. *atromarginatum* (Chiov.) Vav. (Ciferri, Giglioli 1939: fig. 43; Ciferri 1943a: no. 258), *T. turgidum abyssinicum* var. *densopilosum* (Ciferri, Giglioli 1939: fig. 51; Ciferri 1943a: no. 59), or *T. durum abyssinicum* var. *praesemiticum* Vav. and *T. durum abyssinicum* var. *tehertchericum* Vav. (Ciferri, Giglioli 1939: figs 24, 26; Ciferri 1943b) seem to show close similarities with those represented on Aksumite coins (Figs 7G–7J). If so, cereal ears can be considered another local element of Aksumite culture, in addition to others such as the tiara of the kings (Hahn 2003: 768), which may have been depicted on the coins of the kingdom.

On the obverse of some copper/bronze coins (Munro-Hay 1984: 54, Aphilas AE.2; Munro-Hay, Juel-Jensen 1995: 95–96, Aphilas nos 13, JJ193; Pedroni 1997: 92, cat. nos 28–29; Hahn, West 2016: 41, cat. nos 41–44;) and of one silver coin (Munro-Hay 1990: 238, pl. 23B), all of Aphilas, the principal design consists of a cereal ear, shown laterally with respect to the axis of the



Fig. 8. A. Bronze coin of Aphilas (Pedroni 1997: 92, cat. no. 28). B. Copper coin of Aphilas (from Hahn, West 2016: 41, cat. no. 43, JJ 475). C. Bronze coin of Ezanas (from Munro-Hay 1999: pl. 6, cat. no. 67). D. Copper coin of Ezanas (Hahn, West 2016: 55, cat. no. 117, JJ 167). E. Gold coin of Ezanas (from Pedroni 1997: pls 9–10, cat. no. 70). F. Bronze coin of Mehadeyos (from Pedroni 1997: pls 15–16, cat. no. 203).

rachis and featuring two rows of spikelets, with the terminal spikelet positioned centrally with respect to the rachis axis. The rachis comprises thirteen internodes bearing spikelets with typically rounded grains, all with long bristles that converge upwards (Figs 8A, 8B). This particular ear seems also to be present on the reverse of a pagan period copper/bronze coin of Ezanas, the last pre-Christian and also the first Christian monarch of Aksum, who ruled for much of the 4th century AD (Munro-Hay 1978: 261, Ezanas pagan AE2).

A cereal ear as main design is also present – in an unusual fashion – on the reverse of some copper/bronze coins of king Ezanas (Figs 8C, 8D) (Anzani 1926: tav. B, no. 30; Munro-Hay 1999: pl. 6, cat. no. 67; Hahn, West 2016: 54–55, cat. nos 115–118). Although these ears are morphologically similar to those described above, they have basal and median spikelets without awns or with short ones; only the upper spikelets bear long awns.

Bronze coins of Aphilas with an ear as the main reverse design were noticed both by Conti Rossini – who identified the ear as wheat, or rather barley (Conti Rossini 1927: 180, 188). The general morphology of these ears differs

little from those depicted on the gold coins of Endybis and Aphilas; the principal dissimilarity consists of long upward–converging bristles that are present on all the spikelets. The fact that these ears represent a main coin type and therefore benefited from the greater area available probably favoured this type of depiction of the awns – which is not seen on gold coins, probably because here they are components of a more complex decoration scheme, centred on the royal bust, where the ears function as a frame and space is more restricted. However, this hypothesis might be refuted by the unusual cereal ear depiction as main design on the bronze coins of Ezanas (Anzani 1926: tav. B, no. 30; Munro-Hay 1999: pl. 6, cat. no. 67; Hahn, West 2016: 54–55, nos 115–118).

Ears resembling those present on the gold coins of Endybis and Aphilas enclose the king's image on both the obverse and reverse of a gold coin of Ezanas (e.g. Pedroni 1997: tavv. 9–10, cat. no. 70) (Fig. 8E). These ears are shown laterally with respect to the rachis axis, and have grains with the usual rounded form, two rows of spikelets attached to fifteen rachis internodes, or sixteen in the right-hand ear on the reverse. Moreover, they are semi-awned, with the bristles on the basal, median and upper spikelets more roughly represented than those on older coins. Another difference with respect to earlier gold coins is the lack of a central terminal spikelet on all four ears depicted on this coin. This lack is seen in all subsequent representations of ears.

These last two differences are also found on coins of later periods – such as, for example, on the obverse of some coins (this time in bronze with gold gilt) of Meḥadeyos (e.g. Pedroni 1997: tavv. 15–16, cat. no. 203), dating to the first half of the 5th century AD (Fig. 8F). On this coin, which is not always clearly legible, the ears are also characterized by fewer – eleven – internodes.

Similar ears, which enclose a cross, are found on the reverse of a silver coin, with traces of gold gilt, of king Meḥadeyos (Pedroni 1997: 113, cat. no. 200), who seems to have been the only king on whose silver coins cereal ears are shown enclosing something other than the royal image (Fig. 9A).

Ears with eleven internodes, which frame a bust on both the obverse and the reverse, are also found on a more recent gold coin of Kaleb that probably dates to the early 6th century AD (e.g. Pedroni 1997: tav. 23, cat. no. 263) (Fig.



Fig. 9. A. Silver coin of Mehadeyos (from Pedroni 1997: 113, cat. 200). B. Gold coin of Kaleb that probably dates to the early 6th century AD (Pedroni 1997: tav. 23, cat. no. 263). C. Bronze coin of Wazena (Munro-Hay 1999: pl. 40, cat. no. 427). D. Bronze coin of Armaḥ (Pedroni 1997: tav. 30, cat. no. 368). E. Bronze coin of Ḥatāz (Pedroni 1997: tav. 31, cat. no. 400).

9B). In this case, the (not always clearly discernible) ears show the usual general structure; moreover, the basal and middle spikelets seem to bear awns of ever decreasing size, although they could have been partially erased by the wear undergone by this coin.

In the late Christian period, not only do ears continue to frame busts present on the obverse and reverse of coins, but single specimens may also be present on the obverse, with the stem held in a hand of the various busts represented, or surmounted by a cross, e.g. on some bronze coins of king Wazena dating to the first half of the 6th century AD (Anzani 1926: tav. I, no. 253; Munro-Hay 1999: pl. 40, cat. nos 420, 423, 426, 427) (Fig. 9C).

Lastly, interesting ears are depicted on some bronze coins of Aksum's last kings. On the reverse of some bronze coins, with traces of gold gilt, of king Armaḥ from the first half of the 7th century AD (Anzani 19626: tav. 1, no. 261;

Pedroni 1997: 134–38, Armaḥ AE1 gilt, cat. nos 367–397) the ears enclose a cross (Fig. 9D), and on the obverse of two coins of Ḥatāz (Pedroni 1997: 138, cat. nos 399, 400) from the latter half of the same century they enclose a bust (Fig. 9E). The ears are both shown from the side of the rachis axis, have typically rounded grains (slightly more tapered on the coin of Ḥatāz) and are characterized by a far greater number of internodes than on the ears seen on older coins, eighteen on the left ear and twenty on the right one. The ears' central spikelets are absent, while the awns are once more depicted with care, and are longer only on the upper spikelets.

Thus, the examination and analysis of cereal ear representations on the coins of the realm of Aksum yields a preliminary picture of their morphological evolution. The ears appear to be always shown with the axis of the rachis visible laterally and with two rows of spikelets with round-shaped grains. Other features, though, change not only over time, but also according to the metal – gold or bronze – from which the coins are made. After ears with few internodes – fifteen or sixteen, as depicted on the oldest gold coins, of Endybis, Aphilas and Ezanas, or twelve, as on the bronze coins of Aphilas – come those with even less, such as the eleven-segment ears depicted on the bronze and silver coins of Meḥadeyos (and probably on the gold coins of Kaleb), followed lastly by the ears of greater length with more internodes portrayed on the silver coins of the realm's latest kings, Armaḥ and Ḥatāz. Similarly, a certain evolution may also be noted regarding the representation of the awns: these are long and carefully depicted in the oldest gold coins, such as those of Endybis and Aphilas, and shorter and more roughly portrayed on the gold, silver and bronze coinage of later periods. One of the elements that seems to undergo a certain change is the terminal spikelet, which always appears in a central position but seems to be present only on ears represented on older coins. It is found in ears enclosing busts on the obverse and reverse of gold coins of Endybis and Aphilas, and in those with long bristles that constitute the principal decoration on the reverse of bronze and silver coins of Aphilas and bronze coinage of Ezanas.

Analysis of cereal ear representation might therefore be considered of use, together with other features, for assessing the chronology of coins of the kingdom of Aksum.

With respect to the cereal species depicted, it may be added that the ears' general morphology also suggests a correlation with two-rowed barley (*Hordeum vulgare* L. subsp. *distichum*), although the absence of any elements representing the sterile spikelets characteristic of this variety of barley must be noted. In this regard it should be borne in mind that Vavilov, in his discussion of north-eastern Africa, and Abyssinia in particular, as one of the fundamental diversity centres of cultivated barley (together with south-western Asia), states that *distichum* varieties of barley in which lateral spikelets do not develop were cultivated here (Vavilov 2015: 67-69). It is also possible that the stylization adopted in the production of images reproduced on coins – in this case of cereal ears – might have involved a focus on the ear's main components and the non-representation of certain minor details. This would allow the ears present on most Aksumite coins to be considered *distichum* barley rather than wheat. Their identification as *distichum* barley is, however at odds with the limited presence of awns on ears on Aksumite coins: as mentioned above, only the upper spikelets portrayed have long bristles, while on the middle and lower ones they are much smaller. In ears of *distichum* barley, on the other hand, the lower and upper fertile spikelets generally bear bristles of similar length.⁵

Cereals in Ethio-Eritrean agriculture

Barley is a cereal of low cytogenetic and taxonomic complexity, comprising only diploid species ($2n = 14$), with a generally constant ear structure featuring three spikelets, not always all fertile, for each internode of the rachis (Zohary, Hopf, Weiss 2012: 51–53). Emmer, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell., and turgidum wheat, *Triticum turgidum* L. subsp. *turgidum* are tetraploid wheats, but while emmer is one of the hulled wheats in which the grains are firmly enclosed within the spikelets, turgidum wheat is one of the naked or free-threshing wheats. They have twice as many chromosomes ($2n=28$) as barley (Zohary, Hopf, Weiss 2012: 23-33).

Ethiopia's rich plant biodiversity led Vavilov to include this area among what he called the primary centres of origin and diversity of the tetraploid

⁵ See footnote 4.

wheats. According to Vavilov, the primary centres of origin are those regions of the world in which certain plant species display a high degree of polymorphism, *i.e.* the coexistence of numerous varieties, a variability much greater than is present in other areas. This situation is due to an elevated level of dominant characters. Secondary centres of origin, on the other hand, are areas into which certain plant species have spread, undergoing there new selection processes dictated by environmental conditions different from those of the primary centres. This led to the formation of new cultivated varieties that in these areas manifest recessive characters that are not displayed in the primary areas of origin (Forni 1969, and references therein). Although in recent decades Vavilov's initial theory has been widely reconsidered and revised – including (among other changes) the transferral of Ethiopia among zones that Vavilov considered the secondary areas of origin of tetraploid wheats (D'Andrea, Haile 2002, and references therein) – the fact remains that the Ethio-Eritrean Highlands are a privileged observatory for studying the historical development of these cereals.

The Italian botanists Porceddu and Perrino in 1973 made an expedition to the highlands to collect different wheat species and varieties so as to preserve them from the then already incessant process of genetic erosion. During the survey they collected a large quantity of samples of different species of wheat, both tetraploid, *Triticum dicoccum*, *Triticum durum*, *Triticum turgidum*, *Triticum polonicum*, *Triticum turanicum*, *Triticum carthlicum* L., and *Triticum pyramidale*, and hexaploid, *Triticum compactum*, *Triticum spherococcum* and *Triticum spelta* (Porceddu and Perrino 1973). Besides these, they also found a great number of intermediate types, which were difficult to classify just on the basis of ear morphology – which attested how, even without human interference, certain species could hybridize. Similar difficulties were encountered in subsequent work (Bekele 1984; Tesfaye, Getachew, Woredem 1991); in some cases, only by means of cytogenetic characterization was correct determination of the landraces of turgidum wheat possible (Belay, Merker, Tesemma 1994). The wide variety of Ethiopian grains, which include types with purple or blue grains (Zeven 1991), and their differences from those present in other parts of the world are probably due to geographical isolation (Bekele 1984; Ethica, Belay, Bekele 2006), which may have favoured the for-

mation and conservation of varieties in which adaptations to the highland climate (characterized by dry winters and rainy summers) have developed. Durum wheat varieties are generally plants that require water especially in the first period of growth, while in the mature state they tolerate drought well, more than common (bread) wheats (Vavilov 2015: 55).

To this should be added the observation that over the centuries Ethiopian farmers, intentionally or otherwise, have cultivated different cereal varieties in order to diversify their diet and, at the same time, to reduce the risk of financial loss in case of pest attack or adverse weather conditions (Ethica, Belay, Bekele 2006; Bekele 1984). At times these diverse varieties were grown simultaneously on the same terrain, in accordance with the *hanfetse* practice, which in recent times involves the contemporary cultivation of barley and free-threshing wheat – or, more traditionally, emmer and barley. The same term was used to refer to the contemporary farming of other crops, such as t'ef with linseed or barley, sorghum with finger millet, and many other combinations, including certain legumes (D'Andrea, Lyons, Haile, *et al.* 1999: 111–12).

Pre-Aksumite and Aksumite agriculture: a preliminary summary and new data

Wheat and barley were undoubtedly important in the agriculture practiced in Ethiopia and Eritrea in the 1st millennia BC and AD, as already mentioned by other authors (D'Andrea, Richards, Pavlish, *et al.* 2011: 369).⁶ There is ample evidence of these plants, considered among the most significant of the *Near Eastern founder crop package* (Zohary, Hopf, Heiss 2012: 20–22), in the Ethiopian-Eritrean archaeobotanical record of this period, based on archaeobotanical investigations conducted at some of the sites investigated in recent decades (Fig. 10).

In several Ona culture sites in Eritrea the consumption of a considerable variety of plants has been recorded: at Sembel, Ona Gudo and Weki Duba, which date to the first half of the 1st mill. BC, remains of emmer (*Triticum*

⁶ The importance of emmer cultivation in the modern epoch is attested by Vavilov (2015: 58), who relates that in Abyssinia in the mid-20th century the cereal was grown by dwellers near the River Maze and by the Amhara, an ethnic group from central Ethiopia.

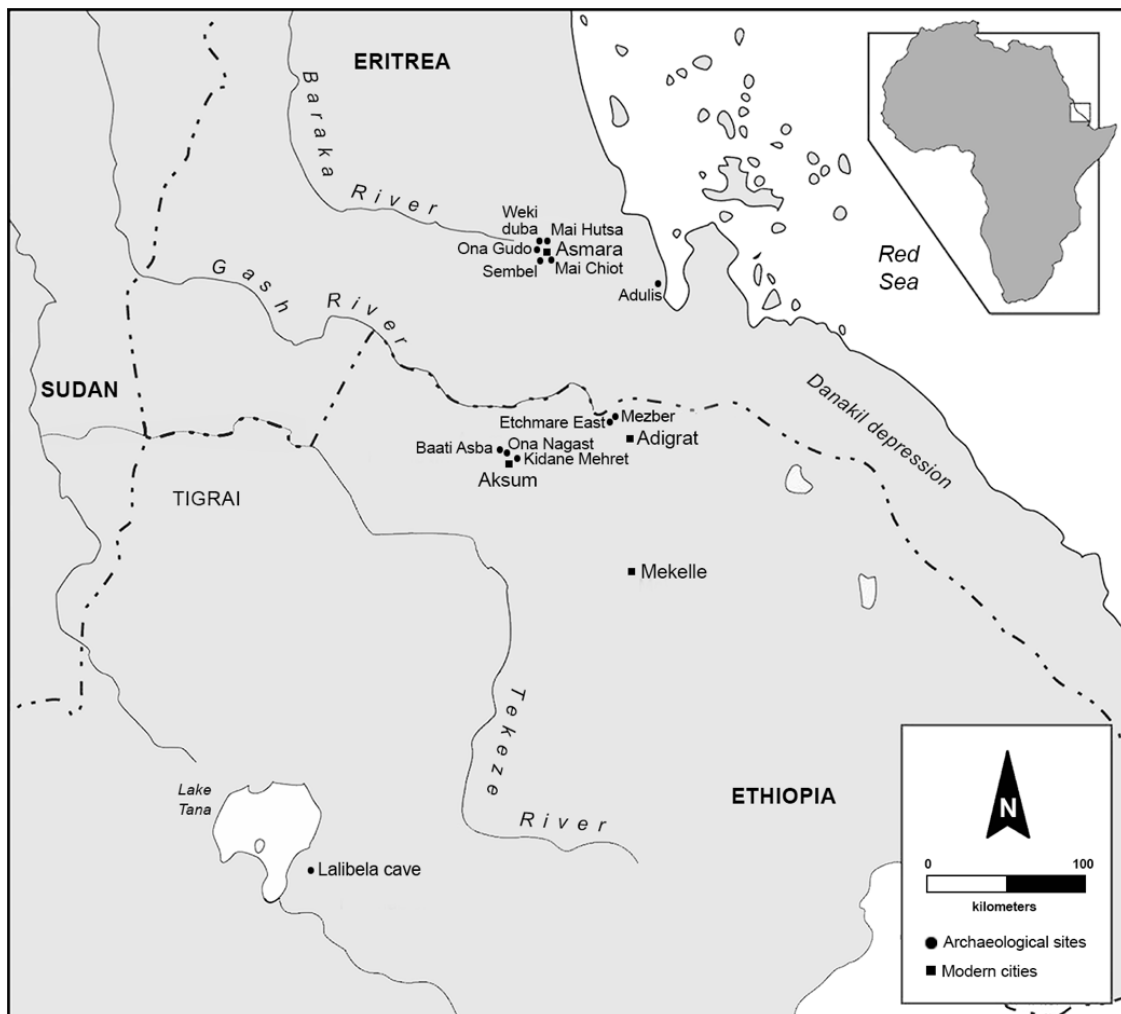


Fig. 10. Map of the northern Horn showing archaeological sites mentioned in the text (modified from Nixon-Darcus, D'Andrea 2017, fig. 2).

dicoccum), free-threshing wheat (*Triticum durum/aestivum*), barley (*Hordeum vulgare*), lentil (*Lens culinaris*) and linseed (*Linum usitatissimum*) were found.

At Mai Hutsa (May Ḥuṣa), which also dates to the first half of the 1st millennium BC, the absence of clearly identifiable grains of barley (*Hordeum vulgare*) barley is worthy of note. In this site lentil and linseed were also present. At Mai Chiot (May Čəḥot), a 4th century BC site, a grain of *tēf* (*Eragrostis tef*), a local cereal, was recorded, besides barley, lentil, and linseed (Schmidt, Curtis 2001; D'Andrea, Schmidt, Curtis 2008).

In pre-Aksumite layers in the site of Mezber remains of barley (*Hordeum vulgare*), free-threshing wheat (*Triticum durum/aestivum*), *tef* (*Eragrostis tef*), lentil (*Lens culinaris*), and linseed (*Linum usitatissimum*) were found (Beldados, D'Andrea, Manzo 2015; D'Andrea, Perry, Nixon-Darcus, *et al.* 2018).

The pre-Aksumite deposits at D site of Kidane Mehret (Kidānā Məhrät), in Aksum, has yielded hulled barley, also of the *distichum* variety (*Hordeum vulgare*), emmer (*Triticum dicoccum*), linseed (*Linum usitatissimum*), and a type of legume (*Viciae*) (Boardman 2000a: 363–68). In addition, *tef* (*Eragrostis tef*) was identified, even if the archaeological context in which it has been found was contaminated, as already underlined in recent archaeobotanical reports (D'Andrea, Schmidt, Curtis 2008: 213).

Preliminary archaeobotanical investigation of the pre-Aksumite site of Baati Asba (Bä'atti Asba), at Betä Giyorgis documented the presence of one cereal fragment (Fattovich, Manzo, Di Blasi, *et al.* 2001), while contemporary mid I millennium BC deposits in the Lalibela Cave (Stratum Ic) have yielded remains of barley, chickpeas, and maybe pea and vetch, besides other unidentified seeds (Dombrowski 1970; Dombrowski 1971: 148–49).⁷

To summarize, the pre-Aksumite and mid 1st mill. BC Ethio-Eritrean archaeobotanical record therefore features hulled wheat, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell., free-threshing wheat, *Triticum durum/aestivum*, barley, *Hordeum vulgare* L., lentil, *Lens culinaris* L., chickpea, *Cicer arietinum* L., maybe pea, *Pisum* cf. *sativum*, and vetch, *Vicia* cf. *ervilia*; linseed, *Linum usitatissimum* L., is also attested. These plants are considered to have been imported from the Near East; the only indigenous domesticate was *tef*, *Eragrostis tef*, attested both at Mai Chiot and Mezber.

Carbon and nitrogen stable isotope analysis of human remains of an individual, interred maybe in a pit-grave,⁸ from the site of Etchmare East, near Mezber, indicates that the individual had a predominantly vegetarian plant-

⁷ A radiocarbon date was obtained for this stratum from Yale Radiocarbon Laboratory: 2470 ± 80 BP, Y-2434, Square A - 4, 178-186 centimetres deep, Lalibela I c (Dombrowski 1970, 1971). Calibration using the INTCAL13 dataset and the OxCal 4.3 online version (Bronk Ramsey 2009) yielded an age of 785–408 cal. BC at 2 sigma.

⁸ A left distal humerus fragment was submitted for radiocarbon dating by Accelerator Mass Spectrometry, with a resulting determination of 2290 ± 50 BP (405–345 cal. BC at 2 sigma) (TO-13051), a later stage of pre-Aksumite period (D'Andrea, Richards, Pavlish, *et al.* 2011).

based diet, featuring 80% C3 plants, such as wheat, barley, lentil, and linseed, and 20% C4 plants, including *tef*, finger millet and sorghum (D'Andrea, Richards, Pavlish, *et al.* 2011).

Regarding the following period, in Aksumite layers at the site of Ona Nagast ('Ona Nāgāst), on Bieta Giyorgis Hill, considerable quantities of different plant remains are present, including again grains of emmer (*Triticum dicoccum*), free-threshing wheat (*Triticum durum/aestivum*), hulled barley (*Hordeum vulgare*), lentil (*Lens culinaris*), linseed (*Linum usitatissimum*), and *tef* (*Eragrostis tef*), however also present during the proto-Aksumite at this site, besides finger millet (*Eleusine coracana*) and grapevine (*Vitis vinifera*) (Bard, Fattovich 1995; Fattovich, Bard 1993 [1995]; Hansen, 1995; Bard, Fattovich, Manzo, *et al.* 1997; Bard, Di Blasi, Fattovich, *et al.* 1998; D'Andrea 1997; Bard, Coltorti, Di Blasi, *et al.* 2000; Fattovich, Manzo, Di Blasi, *et al.* 2001; D'Andrea 2008). Archaeobotanical investigation of Aksumite layers in a domestic area on the plain to the east of Bieta Giyorgis Hill has identified emmer (*Triticum dicoccum*), free-threshing wheat (*Triticum durum/aestivum*), barley (*Hordeum vulgare*), lentil (*Lens culinaris*), pea (*Pisum sativum*), broad bean (*Vicia faba*), grapevine (*Vitis vinifera*), gourd (*Cucurbita* sp.), linseed (*Linum usitatissimum*), cotton (*Gossypium* sp.), noog (Amharic *nug*, *Guizotia abyssinica*), and possibly *Brassica* sp. (Phillipson 1996; Phillipson, Reynolds 1996).

Archaeobotanical analysis carried out on some samples from the Classical Aksumite Tomb of the Brick Arches at Aksum led to the identification of a few charred cereal grains, such as barley, sorghum, and emmer wheat, together with seeds of other crops and wild plants, grapevine, cotton, linseed, and grasses. These plants, though, except the sorghum, are considered intrusive (Boardman 2000c: 127–28).

In Late Aksumite deposits of D site of Kidane Mehret, in Aksum, hulled barley, also of the *distichum* variety (*Hordeum vulgare*), emmer (*Triticum dicoccum*), linseed (*Linum usitatissimum*) associated with *tef* (*Eragrostis tef*), bread wheat (*Triticum aestivum*), oat (*Avena* sp.), finger millet (*Eleusine coracana*), sorghum (*Sorghum bicolor*), lentil (*Lens culinaris*), pea (*Pisum sativum*), grass pea (*Lathyrus sativus*), field bean (*Vicia faba* var. *minor*) and chickpea (*Cicer arietinum*), as well as grapevine (*Vitis vinifera*), pumpkin (*Lagenaria siceraria*), brassicas (*Brassica* spp.), and cress (*Lepidium sativum*)

were present. Other finds are noog (*Guizotia abyssinica*), cotton (*Gossypium* sp.), and Sudan teak (*Cordia africana*) (Boardman 2000a: 363–68).

Similarly, in Late Aksumite layers at the K site in Aksum the remains of various cereals have been found – *tef* (*Eragrostis tef*), hulled barley (*Hordeum vulgare*), emmer (*Triticum dicoccum*), bread wheat (*Triticum aestivum*), *Triticum* sp., finger millet (*Eleusine coracana*), oat (*Avena* sp.) – together with legumes such as lentil (*Lens culinaris*), grass pea (*Lathyrus sativus*), chickpea (*Cicer arietinum*), *Viciae* indet., and other plants including grapevine (*Vitis vinifera*), linseed (*Linum usitatissimum*), noog (*Guizotia abyssinica*), cotton (*Gossypium* sp.), Sudan teak (*Cordia africana*) and cress (*Lepidium sativum*) (Boardman 2000b: 412–14).

During the proto-Aksumite and Aksumite periods, the archaeobotanical record of the Ethio-Eritrean region therefore features hulled wheat, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell., free-threshing wheat, *Triticum durum/aestivum*, *Triticum aestivum*, and barley, *Hordeum vulgare* L. in particular. Other plants are also recorded, such as *tef*, *Eragrostis tef* (Zucc.) Trotter., finger millet, *Eleusine coracana* Gaertn., sorghum, *Sorghum bicolor* (L.) Moench., chickpea, *Cicer arietinum* L., lentil, *Lens culinaris* L., grass pea, *Lathyrus sativus* L., pea, *Pisum* sp., broad bean, *Vicia faba* L., grapevine *Vitis vinifera* L., linseed, *Linum usitatissimum* L., noog, *Guizotia abyssinica* Cass., cotton *Gossypium* sp., gourd, *Lagenaria siceraria* (Molina) Standl., wanza or Sudan teak, *Cordia africana* Lam., and cress, *Lepidium sativum* L.

Further evidence mainly relating to cereal exploitation during the Aksumite period comes from recent archaeobotanical research carried out as part of the *Adulis Project*.⁹

⁹ The project was conducted thanks to financial support from the Eritrean Government, Gruppo Piccini, Ce.R.D.O. (Centro Ricerche sul Deserto Orientale), the universities, and ISMEO – Associazione Internazionale di Studi sul Mediterraneo e l’Oriente. The joint project involved the participation of the National Museum of Eritrea, the Northern Red Sea Regional Museum, the Università degli Studi di Napoli “L’Orientale”, the Università Cattolica del Sacro Cuore (Milan), the Politecnico di Milano, ISMEO, the Pontificio Istituto di Archeologia Cristiana (Rome), and Ce.R.D.O., with the patronage of the Museo Civico di Rovereto and the archaeology magazine *Archeologia Viva*. I would like to thank the scientific directors of the project Angelo Castiglioni (Ce.R.D.O.), Serena Massa (Università Cattolica del Sacro Cuore), and Yohannes Gebreyesus (Northern Red Sea Regional Museum di Massawa) and all his team, besides Italian colleagues and friends of the expeditions, Susanna Bortolotto, Ester Bucchi de Giuli, Gabriele Castiglia, Nelly Cattaneo, Gabriella Giovannone, Paolo Lampugnani, Chiara Mandelli, Laura Masina, and Paolo Visca.

The Eritrean coastal town of Adulis was of great importance due to its geographical position between the Red Sea and the Indian Ocean, throwing light on the long-term history of contacts in this area from prehistory to the Classical period. It was the main trading port in the northern Horn of Africa during antiquity and has always been considered to have been under the influence of the Aksumite kingdom (Zazzaro 2013; Zazzaro, Cocca, Manzo 2014; Zazzaro, Cocca, Carannante, *et al.* 2014).

During the archaeological exploration conducted in 2017 and 2018 a first archaeobotanical investigation was launched, aimed at finding remains of plants used by the town's ancient inhabitants and reconstructing their diet, agricultural techniques and exploitation of the surrounding environment. The research followed two distinct lines of enquiry, the first involving the recovery of seed and fruit remains through sieving and flotation of a number of soil samples, and their subsequent analysis. The second consisted of detecting and identifying plant imprints on brick fragments found on the site. The study of this evidence provided an initial impression of the relationship that existed between humans and their environment in this area of the Eritrean lowlands.

The preliminary results point to the cultivation of barley, *Hordeum vulgare* L., and emmer, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell.

A carbonized barley grain fragment was found in a sample taken from the content of a *tannur* sited in the living area of a building located in a craft and residential district (Sector 5, Room 3, Tannur 3), at the southern edge of the town along the river Haddas (Zazzaro, Cocca, Carannante, *et al.* 2014; Zazzaro 2019). Radiocarbon determination of charcoal fragments found at the bottom of this oven dated these remains to the second half of the 5th–late 6th century AD (Zazzaro, Cocca, Manzo 2014).

A further attestation of barley consists of the impression of a grain in a brick fragment collected from a feature investigated in Sector 2 (square G10 608, SU 2127), where the “Altar of the Sun” was located. In the fill of a cut in the same area (Sector 2, SU 2514), another grain of barley, and two glume bases and a rachis segment of emmer (Fig. 11) were found. Associated potsherds date these features to the 5th–6th centuries AD, which includes what are known as the Middle Aksumite and Late Aksumite periods (AA.VV. 2017: 53; AA.VV. 2018: 51).

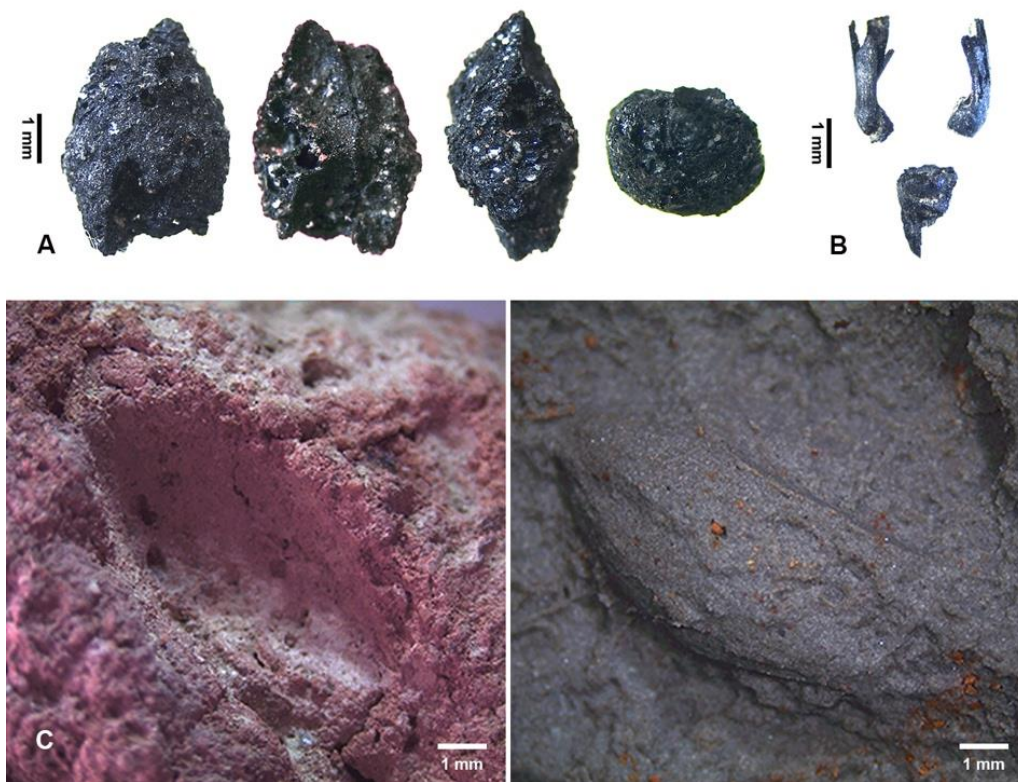


Fig. 11. Some archaeobotanical evidence from Adulis.
 A. Charred grain of barley, *Hordeum vulgare* L.,
 in dorsal, ventral, and lateral views, and transverse section.
 B. Glume bases and rachis segment of emmer,
Triticum turgidum L. subsp. *dicoccum* (Schrank) Thell.
 C. Impression of barley grain, *Hordeum vulgare* L.,
 in brick fragment (left) and cast (right).

Conclusions

This work has provided useful new evidence for the identification of the species of cereals represented on the coins of the kingdom of Aksum. Most of the ears shown on the Aksumite coins considered here appear to depict wheat, such as, maybe emmer wheat, *Triticum turgidum* L. subsp. *dicoccum* (Schrank) Thell., or perhaps – according to a new hypothesis – also some varieties of tetraploid free-threshing wheats (*Triticum turgidum* L.), such as *turgidum* wheat (*Triticum turgidum* L. subsp. *turgidum*) or some Ethiopian land-race of tetraploid free-threshing wheats, that might have been cultivated during the Aksumite period – although this conclusion requires verification by

means of a thorough analysis of the entire Aksumite numismatic corpus, taking into consideration numismatic metrology, coin types and currency history. This study should also be accompanied by a careful electron microscope examination, ensuring that the smallest details depicted on the coins are reliably interpreted.

In the Aksumite coinage, the depiction of some likely landrace of tetraploid free-threshing wheat encircling the images of kings could be put together with other elements indicating the indigenous culture of the Ethio-Eritrean region. To these may be added the few features imitative of Roman coinage and the concept designs from some South-Arabian precedents (Hahn 2003: 768). All these items could suggest viewing Aksumite coinage, generally considered a means for the diffusion of the kingdom's official propaganda (Munro-Hay 1978: 130), as featuring endogenous elements and exogenous features of different cultural and geographical origins assembled in an original syntax aimed at expressing local social and symbolic messages related to the power of the kings and the local elite, as already attested in some artworks from these territories in more ancient periods (Manzo 2009).

Cereal ears on Aksumite coins have been interpreted in the light of studies focused on the cereals used in Ethio-Eritrean agriculture and of the region's archaeobotanical record, of which a preliminary synthesis is provided. Our knowledge of the agriculture on the Ethio-Eritrean region in the first millennium BC and the first millennium AD is progressively expanding thanks to increased archaeobotanical studies in the Horn of Africa (Tab. 1 and references therein). These studies suggest the dominance of Near Eastern crops, among which free-threshing wheats are included, although they are actually rarely present in the archaeobotanical record of this region. Free threshing wheat grains are known as naked or free-threshing, because the husk round the grains comes off during threshing: these are, in particular, durum wheat, *Triticum turgidum* ssp. *durum*, a tetraploid species, and bread wheat, *Triticum aestivum* ssp. *aestivum* MacKey, a hexaploid species. A distinction between tetraploid and hexaploid free threshing wheats remains can be based only on the analysis of the morphological characteristics of their rachis segments (Zohary, Hopf, Weiss 2012: 29, 39–51). In Ethio-Eritrean archaeobotanical record, in only a few cases has the finding of this evidence, in Late Aksumite deposits at D site (Boardman 2000a: 367) and K site (Boardman 2000b: 413)

at Kidane Mehret, in Aksum, allowed the identification of bread wheat (*Triticum aestivum* ssp. *aestivum* MacKey, a hexaploid species). The introduction of hexaploid wheats to the Ethio-Eritrean region is believed to have occurred in the historical period. Conversely, tetraploid wheats such as durum wheat, that is today by far one of the most predominant cultivated species in the region, are believed to have been present in the region for longer (Vavilov 1926: 1951; Tesemma 1991; D'Andrea 2008), although to date durum wheat has not been identified in the archaeological sites of the territory. Further archaeobotanical studies are thus needed to establish the role of durum wheat in the ancient agriculture of the Horn of Africa. Against this background, the study of the plant remains found in archaeological deposits at Aksum's ancient port of Adulis has yielded an – albeit preliminary – understanding of Aksumite communities' practices regarding their exploitation of cereal resources, namely barley and emmer, in this coastal sector of the Eritrean lowland during the Aksumite period.

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	cultural period	Ancient Ona times					Pre-Aksumite			-	Proto-Aksumite	
		site	Sembel	Mai Chiot	Weki Duba	Mai Hutsa	Ona Gudo	Bieta Giyorgis - Baati Asb	Aksum, D site, Kidane Mehret		Mezber	Lalibela cave
	age*	800-500 BC	400-300 BC	700 BC	800-400 BC	800-350 BC	800-400 BC	800-400 BC	1600 BC-AD1	785-408 BC	400-50 BC	400-50 BC
	reference**	1	1	1	1	1	2	3	4-5	6-7	8-11	12
CEREALS	<i>Triticum dicoccum</i>	+		+		+		+	+			+
	<i>Triticum durum/aestivum</i>	+							+		+	+
	<i>Triticum aestivum</i>											
	<i>Triticum sp.</i>			+		+		+				
	<i>Hordeum vulgare</i>	+	+	+		+		+	+	+	+	+
	cf. <i>Hordeum vulgare</i>	+			+							
	<i>Hordeum sp.</i>							+				
	<i>Triticum/Hordeum</i>											
	<i>Eleusine coracana</i>											
	<i>Eragrostis tef</i>		+						+			
	cf. <i>Eragrostis tef</i>											
	<i>Eragrostis cf. tef</i>											
	<i>Eragrostis sp.</i>											+
	<i>Sorghum sp.</i>											
	<i>Avena sp.</i>											
Cerealia						+	+					
PULSES	<i>Cicer arietinum</i>									+		
	<i>Lathyrus sativus</i>											
	<i>Lens culinaris</i>	+	+	+	+	+		+	+			+
	<i>Pisum sativum</i>											
	<i>Pisum cf. sativum</i>									+		
	<i>Pisum sp.</i>											
	<i>Vicia cf. ervilia</i>									+		
	<i>Vicia faba</i>											
Vicieae							+					
FRUITS	<i>Cordia africana</i>											
	<i>Vitis vinifera</i>											
OTHER CROPS	<i>Gossypium sp.</i>											
	<i>Guizotia abyssinica</i>											
	? <i>Guizotia</i>											
	<i>Linum usitatissimum</i>	+	+	+	+	+		+	+			+
	<i>Lagenaria siceraria</i>											
	<i>Cucurbita sp.</i>											
<i>Lepidium sativum</i>												

follows on the next page

Tab. 1. Preliminary synthesis of the occurrence of plant remains in Ethio-Eritrean archaeological sites in the 1st millennia BC and AD (botanical nomenclature follows traditional classification, according to most archaeobotanical reports).

	cultural period	Early Aksumite			Classic Aksumite		Middle Aksumite		Aksumite	Late Aksumite			Post-Aksumite
		site	Bieta Giyorgis - Ona Nagast I	Bieta Giyorgis - Ona Nagast	Bieta Giyorgis - Ona Enda Aboi Zeugé V	Bieta Giyorgis - Ona Nagast	Aksum, Tomb of the Brick Arches	Bieta Giyorgis - Ona Nagast	Bieta Giyorgis - Ona Nagast III	Bieta Giyorgis - Domestic Area	Bieta Giyorgis - Ona Nagast	Aksum, D site, Kidane Mehret	Aksum, K site, Kidane Mehret
	age*	50 BC - AD 150	50 BC - AD 150	50 BC - AD 150	AD 150-350	AD 150-350	AD 350-550	AD 350-550	50 BC - AD 700	AD 550-700	AD 550-700	AD 550-700	AD 700-900
	reference**	8-11	12	10	12	13	12	8-11	14-15	12	16	17	12
CEREALS	<i>Triticum dicoccum</i>		+		+		+		+	+	+	+	+
	<i>Triticum durum/aestivum</i>	+					+		+	+			+
	<i>Triticum aestivum</i>										+	+	
	<i>Triticum sp.</i>		+		+		+	+		+	+	+	
	<i>Hordeum vulgare</i>	+	+		+		+		+	+	+	+	+
	cf. <i>Hordeum vulgare</i>												
	<i>Hordeum sp.</i>			+				+			+		
	<i>Triticum/Hordeum</i>		+		+		+			+			
	<i>Eleusine coracana</i>		+							+	+		+
	<i>Eragrostis tef</i>		+					+		+	+	+	+
	cf. <i>Eragrostis tef</i>										+	+	
	<i>Eragrostis cf. tef</i>												+
	<i>Eragrostis sp.</i>		+		+		+			+			+
	<i>Sorghum sp.</i>						+				+		
	<i>Avena sp.</i>										+	+	
	Cerealia										+	+	
PULSES	<i>Cicer arietinum</i>										+	+	
	<i>Lathyrus sativus</i>										+	+	
	<i>Lens culinaris</i>		+		+		+	+	+		+	+	+
	<i>Pisum sativum</i>								+				
	<i>Pisum cf. sativum</i>												
	<i>Pisum sp.</i>										+		
	<i>Vicia cf. ervilia</i>												
	<i>Vicia faba</i>								+		+		
Vicieae										+	+		
FRUITS	<i>Cordia africana</i>										+		
	<i>Vitis vinifera</i>		+		+			+	+	+	+	+	
OTHER CROPS	<i>Gossypium sp.</i>								+		+	+	
	<i>Guizotia abyssinica</i>								+		+		
	? <i>Guizotia</i>		+		+		+			+			
	<i>Linum usitatissimum</i>				+		+		+	+	+	+	+
	<i>Lagenaria siceraria</i>										+		
	<i>Cucurbita sp.</i>								+				
	<i>Lepidium sativum</i>										+	+	

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* According to each report, or failing that, to D'Andrea 2008. ** 1. D'Andrea *et al.* 2008; 2. Fattovich *et al.* 2001; 3. Boardman 2000a; 4. Beldados *et al.* 2015; 5. D'Andrea *et al.* 2018; 6. Dombrowski 1970; 7. Dombrowski 1971; 8. Hansen 1995; 9. Bard, Fattovich 1995; 10. Fattovich, Bard 1993 [1995]; 11. Bard *et al.* 1997; 12. D'Andrea 2008; 13. Boardman 2000c; 14. Phillipson 1996; 15. Phillipson, Reynolds 1996; 16. Boardman 2000a; 17. Boardman 2000b.

cultural period	Ancient Ona times					Pre-Aksumite			-	Proto-Aksumite	
	site	Sembel	Mai Chiot	Weki Duba	Mai Hutsa	Ona Gudo	Bieta Giyorgis - Baati Asb	Aksum, D site, Kidane Mehret		Mezber	Lalibela cave
age*	800-500 BC	400-300 BC	700 BC	800-400 BC	800-350 BC	800-400 BC	800-400 BC	1600 BC-AD1	785-408 BC	400-50 BC	400-50 BC
reference**	1	1	1	1	1	2	3	4-5	6-7	8-11	12
WEEDS	Asteraceae	+									+
	Chenopodiaceae/ Amarantaceae	+				+		+			
	cf. <i>Amaranthus</i>										
	<i>Chenopodium</i> sp.										
	<i>Brassica</i> sp.		+						+		
	Brassicaceae	+		+		+		+			
	Caryophyllaceae										
	cf. Caryophyllaceae										
	Compositae							+			
	Convolvulaceae										
	Cyperaceae	+				+					
	<i>Astragalus</i> sp.										+
	<i>Medicago</i> sp.	+									
	<i>Trifolium</i> sp.							+			
	Trifolieae			+							
	Fabaceae		+			+		+			
	Labiatae							+			
	<i>Lepidium</i> sp.										
	Malvaceae		+								
	<i>Cynodon</i> sp.										
	<i>Lolium</i> sp.	+	+	+	+	+			+		+
	<i>Lolium temulentum</i> type	+			+	+					
	cf. <i>Lolium</i>					+					
	<i>Echinochloa</i> sp.										
	cf. <i>Echinochloa</i>					+					
	<i>Eleusine</i> sp.										
	<i>Eragrostis</i> sp.							+			+
	Paniceae	+				+					
<i>Phalaris</i> sp.											
Poaceae	+	+	+	+	+		+	+			
<i>Plantago</i> sp.											
<i>Polygonum</i> sp.											
<i>Rumex</i> sp.							+	+			
Polygonaceae							+				

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Tab. 1. Preliminary synthesis of the occurrence of plant remains in Ethio-Eritrean archaeological sites in the 1st millennia BC and AD (botanical nomenclature follows traditional classification, according to most archaeobotanical reports).

	Early Aksumite			Classic Aksumite		Middle Aksumite		Aksumite	Late Aksumite			Post-Aksumite	
	site	Bieta Giyorgis - Ona Nagast I	Bieta Giyorgis - Ona Nagast	Bieta Giyorgis - Ona Enda Aboi Zeugé V	Bieta Giyorgis - Ona Nagast	Aksum, Tomb of the Brick Arches	Bieta Giyorgis - Ona Nagast	Bieta Giyorgis - Ona Nagast III	Bieta Giyorgis - Domestic Area	Bieta Giyorgis - Ona Nagast	Aksum, D site, Kidane Mehret	Aksum, K site, Kidane Mehret	Bieta Giyorgis - Ona Nagast
age*	50 BC - AD 150	50 BC - AD 150	50 BC - AD 150	AD 150 - 350	AD 150 - 350	AD 350 - 550	AD 350 - 550	50 BC - AD 700	AD 550 - 700	AD 550 - 700	AD 550 - 700	AD 700 - 900	
reference**	8-11	12	10	12	13	12	8-11	14-15	12	16	17	12	
WEEDS	Asteraceae		+		+		+		+			+	
	Chenopodiaceae/Amarantaceae		+		+		+		+	+	+	+	
	cf. <i>Amaranthus</i>		+		+		+		+			+	
	<i>Chenopodium</i> sp.		+		+		+		+			+	
	<i>Brassica</i> sp.		+		+		+		+			+	
	Brassicaceae									+	+		
	Caryophyllaceae									+	+		
	cf. Caryophyllaceae												+
	Compositae									+	+		
	Convolvulaceae										+		
	Cyperaceae		+		+		+			+	+	+	+
	<i>Astragalus</i> sp.		+		+		+			+			+
	<i>Medicago</i> sp.		+		+		+			+	+		+
	<i>Trifolium</i> sp.												
	Trifolieae		+		+		+			+			+
	Fabaceae		+		+		+			+	+	+	+
	Labiatae										+	+	
	<i>Lepidium</i> sp.										+		
	Malvaceae		+		+		+			+	+	+	+
	<i>Cynodon</i> sp.		+		+		+			+			
	<i>Lolium</i> sp.		+		+		+			+			+
	<i>Lolium temulentum</i> type												
	cf. <i>Lolium</i>												
	<i>Echinochloa</i> sp.		+		+		+			+			+
	cf. <i>Echinochloa</i>												
	<i>Eleusine</i> sp.		+		+		+			+			+
	<i>Eragrostis</i> sp.		+		+		+			+			+
	Paniceae		+		+		+			+			
	<i>Phalaris</i> sp.		+		+		+			+			
	Poaceae										+	+	
<i>Plantago</i> sp.										+		+	
<i>Polygonum</i> sp.		+		+		+			+			+	
<i>Rumex</i> sp.		+		+		+			+	+	+	+	
Polygonaceae										+			

follows on the next page

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	cultural period	Ancient Ona times					Pre-Aksumite			-	Proto-Aksumite	
	site	Sembel	Mai Chiot	Weki Duba	Mai Hutsa	Ona Gudo	Bieta Giyorgis - Baati Asb	Aksum, D site, Kidane Mehret	Mezber	Lalibela cave	Bieta Giyorgis - Ona Nagast I	Bieta Giyorgis - Ona Nagast
	age*	800-500 BC	400-300 BC	700 BC	800-400 BC	800-350 BC	800-400 BC	800-400 BC	1600 BC-AD1	785-408 BC	400-50 BC	400-50 BC
	reference**	1	1	1	1	1	2	3	4-5	6-7	8-11	12
WEEDS	Resedaceae											
	<i>Galium</i> sp.							+				
	Rubiaceae							+				
	<i>Rubus</i> sp.					+						
	Rubiaceae											
	Solanaceae							+				
	Umbrelliferae							+				
	<i>Verbena</i> sp.											
	Weeds unident.											
Unident.	+	+	+	+	+				+		+	

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Tab. 1. Preliminary synthesis of the occurrence of plant remains in Ethio-Eritrean archaeological sites in the 1st millennia BC and AD (botanical nomenclature follows traditional classification, according to most archaeobotanical reports).

	cultural period	Early Aksumite			Classic Aksumite		Middle Aksumite		Aksumite	Late Aksumite			Post-Aksumite
		site	Bieta Giyorgis - Ona Nagast I	Bieta Giyorgis - Ona Nagast	Bieta Giyorgis - Ona Enda Aboi Zeugè V	Bieta Giyorgis - Ona Nagast	Aksum, Tomb of the Brick Arches	Bieta Giyorgis - Ona Nagast	Bieta Giyorgis - Ona Nagast III	Bieta Giyorgis - Domestic Area	Bieta Giyorgis - Ona Nagast	Aksum, D site, Kidane Mehret	Aksum, K site, Kidane Mehret
	age*	50 BC - AD 150	50 BC - AD 150	50 BC - AD 150	AD 150 - 350	AD 150 - 350	AD 350 - 550	AD 350 - 550	50 BC - AD 700	AD 550 - 700	AD 550 - 700	AD 550 - 700	AD 700 - 900
	reference**	8-11	12	10	12	13	12	8-11	14-15	12	16	17	12
WEEDS	Resedaceae										+		
	<i>Galium</i> sp.										+	+	
	Rubiaceae												
	<i>Rubus</i> sp.												
	Rubiaceae										+	+	
	Solanaceae		+		+		+			+	+	+	+
	Umbrelliferae										+	+	
	<i>Verbena</i> sp.										+		
	Weeds unident.								+				
	Unident.		+			+		+		+		+	+

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