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NEW ARCHAEOBOTANICAL DATA REGARDING THE DIET OF THE GAVA CULTURE COMMUNITIES FROM THE FORTIFIED SETTLEMENT OF TELEAC (ALBA COUNTY) ROMANIA

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Abstract: The aim of this study is to present new archaeobotanical data regarding the charred macro remains recovered during 2018 archaeological campaign from the famous hillfort Teleac (Alba county, Romania) belonging to Gava culture. The most important evidences of macro remains were recovered from inside of a burnt house from Trench 6 and few pits around it. The archaeological site belonging the Late Bronze Age has offered has provided in last year's very important data regarding the plant species used in the diet of communities which inhabited the hillfort from Teleac.
Keywords: *vegetal diet, Gava culture, Late Bronze Age, macroremains, Teleac.*

INTRODUCTION

The fortified settlement of Teleac has provided in recent years a series of important archaeobotanical evidences that helped us to reconstruct a broad spectrum of plant species cultivated by the communities of the settlement in order to include them in the human diet. These evidences were occasioned by the implementation of an international research project[1] that allowed, among other things, the implementation of a complex strategy for the recovery of plant macro-remains from archaeological contexts belonging to the Gava culture. These archaeobotanical data have helped us in identifying the species preferred by the communities that inhabited the fortified settlement of Teleac.

As we have mentioned in our study from 2021[2] the evidence shows that vegetal diet has had a significant part in the nutrition of LBA communities, which in turn were very much influenced by the availability and abundance of plant resources but also of the climate conditions. The evolution of human communities has been heavily influenced by the potential sources for life sustenance accessible in the area where they live. Southwest of Transylvania was an important source of metal and other natural resources for Bronze Age

[1] LOEWE Project : **Error! Hyperlink reference not valid.**
[2] CIUTA 2021, 102-103.

Fig.1. Site location (map based on Google Earth).

Europe, helping to facilitate the development of increasingly hierarchical societies[3].

Archaeological researches have shown that Teleac site is a fortified area about 30 ha being the largest Late Bronze Age and Early Iron Age hillfort in south-western Transylvania. The oldest occupation belongs to the mid-11th century Gáva culture[4]. New data revealed that Teleac was densely inhabited with an approximate population of about 1200 persons, and that the settlement was spatially well arranged with some parts set aside for large-scale, high temperature production[5]. The adjacent territory had 15 contemporary, open Gáva culture settlements with a population of approximately 2700 persons. Teleac is not the only fortified Gáva settlement in Transylvania and nearby regions, but it is worth remarking that there is a distance to other contemporary fortified sites, which makes it likely that Teleac was a dominant settlement in at least the immediate surrounding territory. Teleac's location in connection to natural resources and transportation routes, and the hillforts relationship with open settlements and the surrounding region[6].

SITE LOCATION

The settlement from Teleac is located in southwestern Transylvania, on the eastern side of the Mureș Valley at the edge of the Secașelor Plateau (Fig. 1). The hillfort is situated on the Grușeț Hill in north of the village. The western slopes of the hill (part of the Secașelor Plateau) descend towards the Mureș floodplain and a dead channel of the river which delimits the settlement in this direction. Recent data obtained by drilling indicate that this channel represents the actual course of the river during Late Bronze Age[7].

The steep parts of the northwest and south of the settlement are good elements of natural fortification, being connected by a well-preserved earth palisade, 600 m long, as well as a ditch that stretches along the northern sector of the settlement Gruşet plateau to the northeastern part of Jidovar Hill, thus blocking the path to the only area of the site where access could be easily made from exterior. The western part is heavily eroded, but seems to have had an easy slope to defend. Even if a substantial effort was needed in the construction of the defense system consisting of ditch and palisade, the economic factor determined the fortification of the 30 ha, being used for this purpose the topography of the place; and if we exclude the steep slopes inside the fortified area, the living area remains only 17.5 ha[8].

In this area prevail a variety of soils like brown soils, podzolic, pseudorendzina soils, eroded regosoils and alluvial soils. The potential natural vegetation is believed to have consisted of forests which have been cut in order to create areas for grazing and crop cultivation (Fig. 3).

[3] COLIN *et alii* 2020, 44.
[4] UHNER *et alii* 2019, 177.
[5] UHNER *et alii* 2019, 177.
[6] UHNER *et alii* 2019, 178.
[7] UHNER *et alii* 2017, 168.
[8] VASILIEV *et alii* 1991, 23-32; CIUGUDEAN 2012, 107-168; UHNÉR *et alii* 2017, 168.

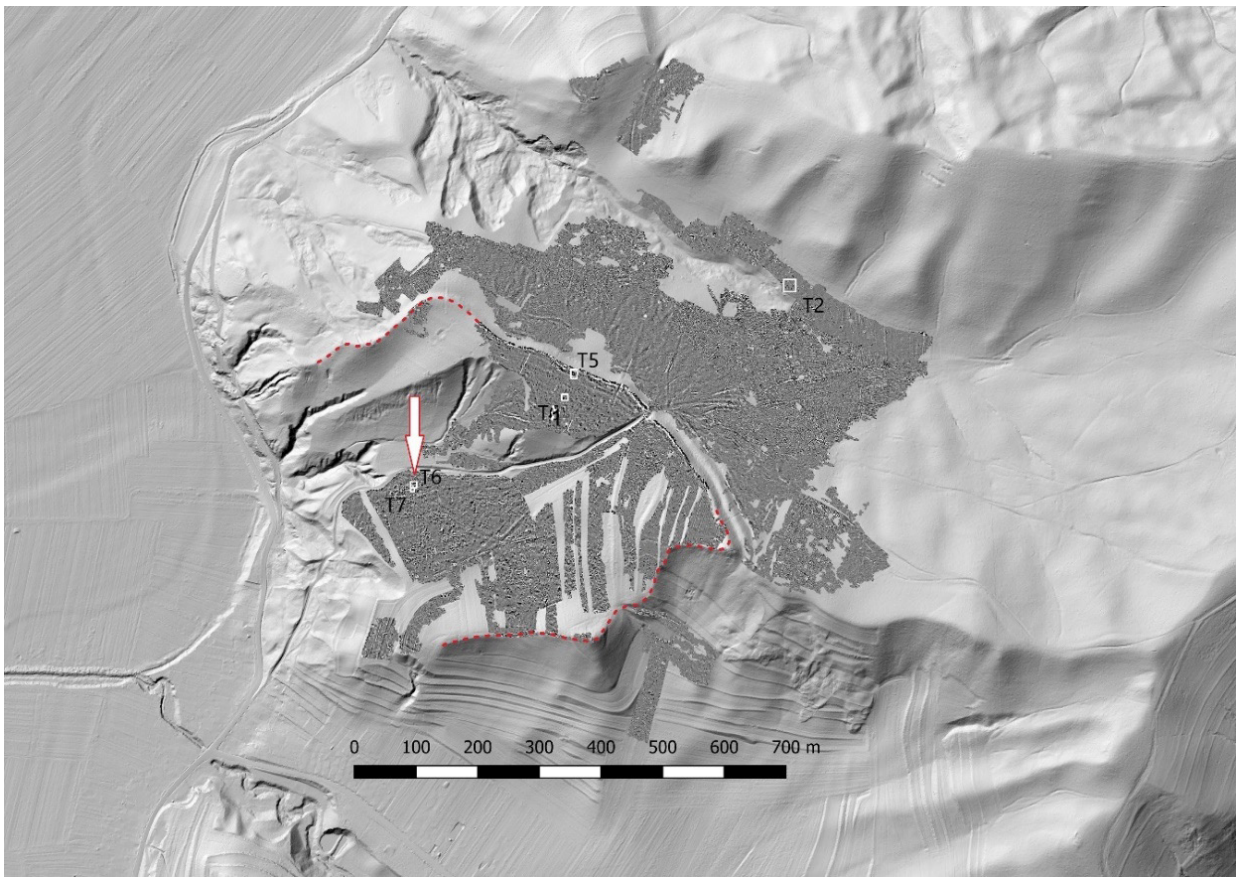

Fig 2. Ortophotoplan of Teleac site marking the boundaries of the fortification and archaeological trenches[9] (arrow indicate Trench 6 and Trench 7).

Fig. 3. Landscape area of Teleac (view from the west to the east side to Jidovar hill, Phtot credit B. Ciută).

[9] by courtesi of Ciugudean H.

It is also important to emphasize the importance of alluvial soils sited down, nearby in the floodplain of Mureș River, that are excellent soils for agriculture[10]. The vicinity of fertile soils has certainly also played a role in the selection of the site[11]. From earliest times human habitat has been influenced and controlled by climate. Man has been able to establish himself only in those areas where climatic conditions were approachable to his activities and needs or where through invention, he was able to modify. Climatic and environmental conditions fluctuated, so that the observer on the ground will have suffered bad years for crop production along with the good ones, as has always been the case. The extent to which human groups buffered themselves against such effects is a cultural matter; there is some evidence that in the Late Bronze Age, for instance, specific strategies were adopted for this precise purpose[12]. The modeled date reveals the chronological period in which fall the settlement from Teleac (Fig. 4).

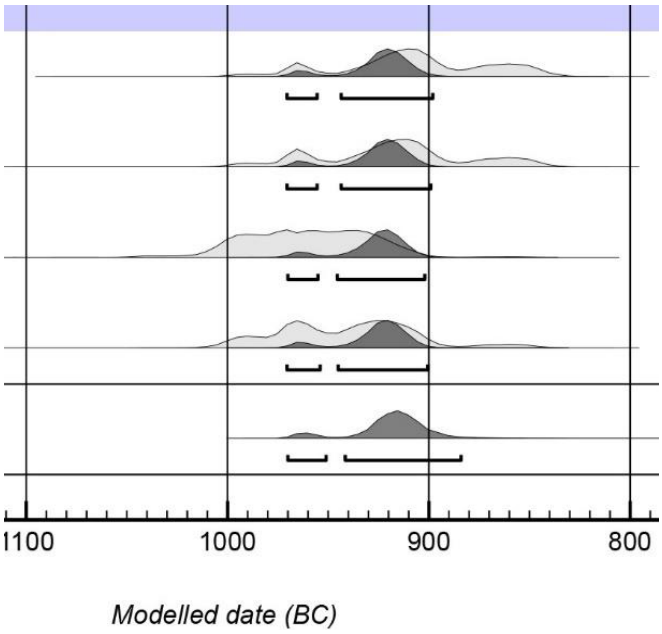

Fig. 4. Modeled date C14[13]

The Bronze Age is assigned to the climatic period called the Subboreal, which is between the Atlantic and the Subtlantic period called the Subboreal. In general, this was a warm and dry period, in contrast to the warm wet Atlantic and the cool wet Subatlantic. Nevertheless, such a mild general statement conceals a mass of small variations, both spatial and temporal. A pollen diagram shows that within the broader picture obtained by traditional pollen analysis there is a similar detailed set of fluctuations happening in the pollen record, which as a proxy climate indicator reflects changes in air temperature, precipitation and so on[14].

[10] VASILIEV *et alii* 1991, 13.
[11] CIUTĂ 2019, 227.
[12] HARDING 2010, 20.
[13] by courtesi of Ciugudean H.
[14] BODNARIUC *et alii* 2002, 1480.

TRENCH 6 AND TRENCH 7

According to the archaeologists who conducted the excavation: *Trench 6 is a 10x10 m trench, opened in the area of the lower settlement, in order to check the habitation structures in this part. The remains of surface buildings with their adjacent pits that all belong to a single level, proof the existence of an area extended for domestic purposes. T7 is a 6x6 m trench, an extension of T6, in order to follow the structure that we discovered in the south-western corner of the trench. In the two trenches were identified two types of features: dwellings and pits, which belong to a single level.*

Considering the distribution of these features were observed that there are groups of features, which could be connected to each other. From this perspective there is the remains from a wall of a dwelling, oriented NNE-SSW, discovered in the south-eastern part of the trench, A8 collapsed in part over the pits A15 and A28 which were dug in the exterior northern part of the building. In the southern part of these remains, there could be distinguished another group of pits: A6, A7, A12, A20, A21 and A22, under another area of collapsed daub. All these pits were probably used as storage pits, and later they became waste pits, due to the fragmentary ceramics, animal bones, or daub discovered inside. They were probably not filled at the time when the buildings were diserted as they had many daub fragments on the top part.

Another group of features is the one in the north-eastern corner. Here, were identified A36, which represents the remains of a foundation wall, together with a row of postholes along it: A24, A25, A26, as well as other two: A41 and A42 perpendicular on this wall and they were filled with bentonite. It seems that here it dealing with the base of a building, constructed in this way, on strong wooden posts, strengthened with bentonite or a small wall, in order to sustain a wooden floor, A37, that was a little heightened than the ground level, probably due to the terrain which is a small slope, as we discovered a burnt floor on top of these holes, and a small hollow, A43, filled with few materials that was formed under the floor. The same as in the case of A8, there are several pits around this dwelling: in the southern part: A28, which was partially excavated as it was identified in the eastern profile, A29 and A30. The first to may have had the same functionality, being used as storage pits and afterwards as waste pits, due to the numerous fragments of sherds and animal bones that we found inside. A 30 had a different destination, a ritual one, as we discovered several complete vessels arranged on the base of it, along with several fragments of grinders, the majority in the upper part. In the north Western part of the trench were identified two waste pits: A38 and A52, and a small posthole A54.

Another type of building is the one represented by A1, which is a pit dwelling. It was identified as a massive daub accumulation, resulted from the collapsed walls from the upper part. This structure can be related with the pits A31, identified in the northern part, A32, A34, at the base of it and A16 in the eastern exterior part.

Trench 7 was opened in the southern part of trench 6 in order to follow the big doub accumulation from T6, that continued outside the perimeter of the trench.

Fig. 5. View to Trench 6 from the east side (Photo credit Uhnér C.)

Fig. 6. Image of Trench 6 with surface house and some of the pits (view from the west, Photo credit Uhnér C.)

A1 looks like the collapsed walls of a building on the upper part, while down it looks like a deepened dwelling. The same as in the case of T6, there is a group of pits around it: waste pits A3 and A5 southern part. Pit A3 which was identified near the western profile had a different use. Even if were identified it as a waste pit due to the material discovered in the upper part: fragmentary ceramics, animal bones, daub fragments, at the base, the pit got wider, and there were placed parts from a skeleton…[15]

ARCHAEOBOTANICAL DATA

In archaeological campaign performed in 2018 were picked 16 soil samples from trenches T5, T6 and T7. Fully, were sampled 14 soil bags of 40 liters and other 2 small samples picked intentionally from T5, T6, T7. That means that were floated **560 liters** of soil. The other samples have been sampled directly from relevant archaeological features. For a complete picture of the plant species from the house and annexes discovered in Trench 6, we must also refer to the macro-remains recovered in the 2017 campaign. There are more nine soil samples that provided charred seeds, mostly from surface dwelling and associated pits. Sum up with samples collected in 2017 campaign from T6, were about 600 liters of soil. Soil samples were washed under running water machine with three different sieves of 2mm, 1mm and 0,5mm meshes. The plant macrofossils were sorted under a magnifying lamp and identified using a binocular microscope, both by comparison with a modern reference collection and with the aid of relevant identification literature.

In this archaeological campaign, the surface dwelling has offered almost all interesting taxons; *3507* charred seeds were retrieved after sorting operation (see Table 1). To general *Cerealia* family were attributed *3356* seeds as it follows: *Cerealia* 229 caryopsis, *Triticum* sp. 188 caryopsis, *Triticum monococcum* 79 caryopsis, *Triticum dicoccum* 63 caryopsis, *Triticum spelta* 2692 caryopsis, *Hordeum vulgare* 66 caryopsis *Panicum cf. miliaceum* 29 seeds, *Triticum compactum/aestivum* 6 caryopsis, *Secale* sp. 1 seed.

Oil plants: few charred amorphous matrixes fragments belonging to *Camelina sativa*. Pulses were identified with 22 seeds/cotyledons: *Vicia faba* 10 seeds, *Lens culinaris* 5 seeds, *Pisum sativum* 2 seeds, *Vicia ervilia* 2 seeds. Fruits: *Cornus mas* 1 stones and 1 fragment nutshell of *Corylus avelana*.

Weeds have been identified with 124 seeds belonging to rudero-segetal species: *Galium aparine* 87 seeds, Galium sp. 29 seeds, *Rumex acetosa* 4 seeds, *Bromus* sp. 1 seed.

From sample no. 12 picked from A28**,** a round shape pit (inside the house) were recovered few *amorphous charred matrixes* containing *Camelina sativa* seeds (Fig. 7). The porous matrix appears to be shiny and somewhat vitrified in some parts. According to researchers H.P. Stika and A.G. Heiss[16], the oilseeds have a very little chance for preservation in charred state due to their high content of fatty oils: when exposed to high temperatures during charring, the highly inflammable oil vaporous usually lead to the rupture of

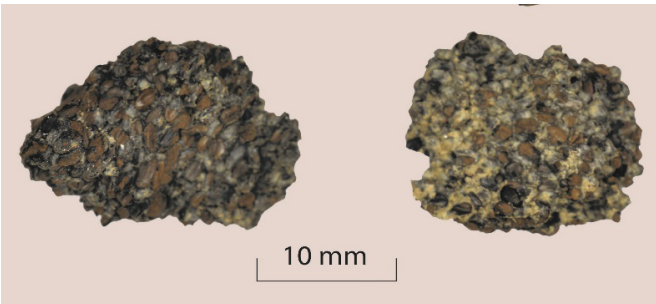

Fig. 7. Charred amorphous matrix of *Camelina sativa* (Photo credit B. Ciută)

the seeds, and to their complete combustion, leaving no analyzable traces for the archaeobotanists. This is a very remarkable find in the late Bronze Age layers. *Camelina sativa* was revealed also in an LBA layer from Thy area, located in northern Denmark[17].

Also, from pit A28 has been retrieved 136 seeds of *Triticum* sp., 61 seeds of *Hordeum vulgare*, 56 seeds of *Triticum dicoccum,* 34 seeds of *Triticum monococcum,* 15 seeds of *Triticum spelta,* 7 seeds of *Panicum* sp., 1 fragment seed of *Pisum sp*, 12 seeds *Galium* sp. 1 seed *Rumex* sp. Together with charred seeds was found one fragment of a *crustlike* seemed (lichen or pooridge?)[18]. We suppose that A28 pit was used initially for storage and only later for waste.

The same is the case of pit A38, too. From sample no. 14 picked from A38 were identified few categories of cereals, pulses and fruits: 75 seeds *Cerealia*, 6 seeds of *Triticum dicoccum,* 5 seeds of *Triticum cf aestivum,* 9 seeds of *Triticum spelta,* 12 seeds of *Panicum miliaceum,* 1 seed of *Hordeum vulgare*, 1 seed of *Vicia faba* /2 frg *Vicia faba,* 1 seed of *Leguminoasae*, 1 stone of *Cornus mas*, 1 nutshell fragment of *Corylus avelana*, 2 seeds of *Rumex acetosa*, 13 seeds of *Galium* sp. It is worth emphasizing the revealing of *Triticum aestivum*. It is the first presence of this specie during three years of research inside Teleac settlement and was revealed from a sample picked from pit A38.

Another interesting discovery which is worth to mention it was made in an archaeological context revealed in Trench 6 during 2017 archaeological campaign. From sample no. 7 picked from pit A1, near the wall of a building were recovered *2650* seeds of *Triticum spelta* after flotation procedure. The yield of spelt wheat had some intrusions of *Galium aparine* (with 76 seeds) but seems that was a pure and cleaned harvest and might be a deliberate storage in the domestic area of the building. Feature A1 where it was sampled no. 7 is a pit dwelling. It was identified as a massive daub accumulation, resulted from the collapsed walls from the upper part. This structure can be related with a series of pits: A31, identified in the northern part, A32, A34, at the base of it and A16 in the eastern exterior part.

It is obviously that inhabitants were included in their diet wild fruits from surrounding area of settlement as it was demonstrated by discovery of few remnants of stones and nutshells of cornelian cherry (*Cornus mas*) and hazelnut (*Corylus avelana*) in Teleac site.

[15] CIUGUDEAN *et alii* 2019, 218.
[16] STIKKA/HEISSa 2013, 78.
[17] STIKKA/HEISSa 2013, 78.
[18] It remains to investigate through specific analyzes.

DISCUSSION

The new data of archaeobotanical research from Teleac hillfort come to strengths again that in the Late Bronze Age agriculture was based mainly on spelta, barley, millet, einkorn, emmer and pulses. The revealing of few *amorphous charred matrixes* containing *Camelina sativa* seeds, in Trench 6 which we presume that was used for oil extraction is an important discovery. Of course, the species may also be related to its inclusion in the human diet, but given the attributions conferred by other discovers from the Bronze Age contexts, the most plausible hypothesis is that of its use for houses lighting.

The Late Bronze Age pure storage find of *Camelina sativa* from Kastanas (Greece) filling a whole vessel, is proof of the intentional use of this oil plant. Likewise, a large quantity (> 8 kg) of crop-processing by-product of *Camelina sativa* from the North Sea coast Late Bronze Age settlement of Rodenkirchen clearly demonstrates its cultivation and use in this region. As gold-of-pleasure is a salt-tolerant plant, it is suitable for cultivation in these marshland areas sometimes affected by storm tides[19].

There are some hypotheses in the specific literature related to cereal fragment concentrations and masses of fragments in an amorphous matrix. They could correspond to various forms of cereal preparations such as bread, porridge or other forms of preparations. When fragments are loose, they could represent some form of cracked wheat or ground malt, depending on the particular features of the fragments. When the finds correspond to lumps of fragments, they could be either some form of food like bread or porridge or an accidental conglomeration of a coarse meal or a fine meal with coarse inclusions, generated through charring. On present evidence it is not possible to differentiate between bread, porridge or accidentally formed lumps on the basis of morphological features of the archaeological finds.[20]

Spelt, einkorn and emmer are hulled (syn. glume) wheats where robust glumes surround the grain. To separate the grain from the glumes, additional steps in processing are necessary: parching by fire, pounding in mortars, repetitive winnowing and sieving. In contrast to modern bread wheat and macaroni wheats are free threshing, which means that their grain falls out of glumes already at threshing. The advantage of hulled wheats is that robust glumes protect the grain more efficiently against pests in the fields (birds and rodents), safeguard it against insects and fungal attacks during storage, thus making them more vigorous than free-threshing wheats.

There are some similar discoveries found in the LBA layers of Kush Kaya, Greece[21]. In a dwelling it was discovered *in situ* a deep vessel with agglomeration of cereal fragments which contains whole and fragmented cereal grains (millet and barley). The ingredients identified in the cereal food remains from this site are in trend with the attendance of millet as a new ingredient introduced during the Bronze Age in the area[22].

During LBA, broomcorn millet (*Panicum miliaceum*) and gold-of-pleasure (*Camelina sativa*)[23] were introduced to the region. Towards the Late Bronze Age, the importance of naked barley and hulled wheats decreased while hulled barley became the main cereal crop[24].

According to researchers who made the investigations in sites from Greece, two species were added to diet of Bronze Age inhabitants from this region. It is about spelt wheat during the Early Bronze Age and millet during Late Bronze Age[25]. Among the contemporary sites with Teleac with rich finds of millet are two sites: Archondiko and Angelochori[26], whereas in Kush Kaya it appears as a dominant crop along with hulled wheats.[27]

The occurrence of *Triticum aestivum* seeds recovered from a sample picked from a pit is another significant discovery made in Teleac settlement during 2018 campaign. In the Late Bronze Age, the importance of the hulled wheats, emmer and spelt, decreased in behalf of bread wheat (*Triticum aestivum*)[28] as it is revealed by archaeobotanical results from LBA contexts.

In the Bronze Age the main pulses were *Vicia faba, Lens culinaris*, and *Pisum sativum* as was demonstrated by archaeobotanical studies. For Greece and southern Bulgaria, Italy, the Pannonian Basin, and the eastern Alps and their foreland, both diversity and representativeness of the pulses are high. There is a tendency to an intensification in pulse cultivation during the Late Bronze Age in certain regions, such as central western Europe, the Alps and their foreland, and Italy[29].

We may state that the most important staples discovered in the surface dwelling from T6 was *Triticum spelta*. It looks that the crops were grown in pure stands. As we mentioned in former studies[30] the charred macro remains from Teleac hillfort provide important data regard the species included in the diet of inhabitants of Gava culture (LBA) who lived inside the fortification between 1000-900 BC.

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[19] STIKKA/HEISS 2013b, 363.
[20] VALAMOTI *et alii* 2019, 106.
[21] POPOV *et alii* 2018, 268-272.
[22] VALAMOTI *et alii* 2019, 106
[23] STIKKA/HEISS 2013b, 349.
[24] GUSTAFSSON 1998, 67-69.
[25] VALAMOTI 2013, 54-60.
[26] VALAMOTI 2013, 54-60.
[27] POPOV *et alii* 2018, 270.
[28] STIKA/HEISS 2013a, 78.
[29] STIKKA/HEISS 2013b, 363.
[30] CIUTĂ 2019, 227-230; 2021, 102-107.

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Table 1. List of plant species from Trench 6 (Teleac, Alba, Romania). Table generated by B. Ciută.

Archaeobotanical analysis for Teleac site **Late Bronze Age**																	
Sample origin	A	A	A1	A10	A1	A12	A1 near wall	A11	A21	A28 house floor	A 32	A 38 pit	A52 pit	A30 ritual pit with pots	A2 pit	A1	**Total**
Sample description	**T6-1**	**T6-2**	**T6-3**	**T6-5**	**T6-1-7**	**T6-2-7**	**T6-7**	**T6-9**	**T6-10**	**T6-12**	**T6-13**	**T6-14**	**T6-15**	**T6-16**	**T7-1**	**T7-2**	**560 liters of soil+ 36 liters**
Cerealia (seeds or fragm.)		18	6		26				18		16	75	55	4	11		229
Triticum sp.	44							8		136							188
Triticum monococcum	9	11	1						3	34	7		1			7	79
Triticum dicoccum										56		6			1		63
Triticum aestivum		1		2								5					8
Hordeum sp.											1						1
Triticum spelta			1				2650			15		9	8		4	5	2692
Hordeum vulgare										61		1			4		66
Secale cereale															1		1
Panicum miliaceum								1		7	9	12					29
Camelina sativa										X							X
Leguminosae (seeds or cotyledons.)	2											1			1frg		3
Vicia faba	2				1						2	1+2 frg			1	1	10
Vicia ervilia													2				2
Pisum sativum									1	1frg							2
Lens culinaris	2+ 2 frg							1									5
Fruits																	
Cornus mas (stone)												1					1
Corylus avelana												1					1
Ruderal species																	
Rumex sp./Rumex acetossella					2							2					4
Bromus sp.										1							1
Galium sp										12	4	13					29
Galium aparine	1	2		1	16		76	1									87
Poa sp.				1	2												3