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ARCHAEOLOGICAL MATERIAL

ARCHAEOBOTANICAL EVIDENCE REGARDING THE DIET OF GAVA CULTURE FROM TELEAC HILLFORT (ROMANIA)

Abstract: The aim of this study is to present a remarkable discovery of several vessels fulfil with charred grains. The vessels have been revealed during 2017 archaeological campaign inside of a burnt house belonging to Gava culture. This is a very rare discovery for Romanian area putting the site of Teleac on the European map of Late Bronze Age diet reconstruction. The most important species revealed were *Panicum miliaceum* and *Triticum spelta*.
Keywords: *diet, macroremains, Gava culture, Late Bronze Age, Teleac.*

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INTRODUCTION

The Bronze Age witnessed important social and economic changes, as attested by the establishment of large, stable, and fortified settlements with trenches and walls of earth, and by specialized growth of the agricultural economy (livestock and plant cultivation). New tools made of more robust materials, including the bronze plough and sickles, played an important role in the agricultural process during the Middle and Late Bronze Age[1]. As it turns out Bronze Age communities adapted to the climate by cultivating species suitable for their environmental conditions. Cereals, legumes, and dried fruits must have been stored for winter consumption[2].

The form of storage for cereals (whole spikelet's or free grains) is not yet securely known. Studies have shown that storage of grains as whole spikelet's provide better protection against fungi and insects, and that the absence of spikelet bases in the seed samples can be linked to their collection and flotation techniques[3]. On the other hand, it is considered that storage was not essential only for the winter season alone. Assumptions are that the production surplus was inherent as a safety measure in the areas where the annual harvest could fluctuate significantly[4]. This surplus could have important implications when used as trade good to acquire other products. An overview of the entire Bronze Age, our focus in the space above, shows that during this period the communities were engaged predominantly in agriculture, preserving their habits from the area of their origin. Th e results of specific analyses show that peasant farming was the mainstay of Bronze Age life. Further, results of archaeobotanical research revealed an important characteristic of the Bronze Age: the purity of cultivated crops.

[1] RENFREW 1973, 66.
[2] CIUTA 2019, 235.
[3] RENFREW 1973, 67.
[4] VULPE *et alii* 2001, 238.

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

Most of the analysed samples contained cereal harvest with very few impurities. Does this reality signify a start in the specialization of everyday activities? Or, respectively, does it signify that communities were mainly occupied with only the cultivation of plants and dedicated themselves exclusively to these skills?[5]

The evidence generally shows that plants played an important role in the subsistence 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 Europe, helping to facilitate the development of increasingly hierarchical societies[6].

SITE LOCATION

The large, fortified 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)[7]. 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.

The site on Grușeț hill was discovered in 1953 and the first excavations were conducted in 1959- 1960, followed by large-scale excavations between 1978 -1987 led by a team formed of V. Vasiliev, H. Ciugudean and A.I. Aldea. The results of these campaigns were published in the monograph of the settlement from 1991[8]. Three habitation levels were identified inside the fortifications: the two oldest are characterised by Gáva material, whereas the youngest level has both Gáva and Early Basarabi material. The site was first dated to span from Ha. B1 to Ha. C5, but in 2009, H. Ciugudean argued that the first horizon in Teleac started already in Ha. A[9]. In 2007, H. Ciugudean and C. F. Pare (Mainz) conducted excavations at the rampart along Jidovar hill and collected construction wood that was dated with C14 about 11th century BC[10].

According to specialists the site from Teleac is a fortified area encompassing 30 ha. Teleac is 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[11]. In light of some new investigations appears that Teleac was densely inhabited with an approximate population of about 1200 persons, and that the settlement was spatially well arranged with some parts

[5] CIUTA 2019, 235.
[6] COLIN *et alii* 2020, 44.
[7] UHNER *et alii* 2017, 168.
[8] VASILIEV *et alii* 1991, 13.
[9] CIUGUDEAN 2009, 67-68; CIUGUDEAN 2012, ;
[10] BOROFKA, CIUGUDEAN 2012.
[11] UHNER *et alii* 2019, 177.

set aside for large-scale, high temperature production[12]. 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[13].

CLIMATE AND VEGETATION

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].

According to palynological analyses for the Romanian intra Carpathian Basin, there seems to have been a cooling of the climate in the second half of the 2nd millennium BC, during which a colder and more humid, but balanced climate was established. The cooler and humid climate favoured the wide spread of beech forests that formed an area of their own by pushing the spruce forests into a more concentrated level. The beech expansion was also accompanied by *Abies* sp., a species that shares the same environmental conditions. The climate, although colder, favoured the planting of cereal species and legumes that were adapted to environmental conditions. The cultivated fields were extended by deforestation, according to palynological analyses, which reveal the presence of ruderal species that usually accompany human settlements and cultivated plots. The flora specific to the intra Carpathian Basin for the targeted segment was made up of species of trees and shrubs represented by *Juniperus, Fraxinus, Betula, Quercus, Ulmus, Salix, Tilia, Corylus, Fagus, Abies, Juglans, Alnus, Picea, Hedera, Viscum, Sambucus, Vitis* and *Pinus*[15]. Grassland herbs and ruderal species were also present, for example *Poaceae, Cerealia, Secale* sp., *Plantago lanceolata, Artemisia* etc. Other plants that populated the intra Carpathian Basin belonged to the taxa *Rosaceae, Ericaceae, Rumex, Ranunculaceae, Rubiaceae, Urticaceae, Cannabis* type, *Polygonum* sp., *Caryophyllaceae, Fabaceae, Brassicaceae, Cyperaceae, Valerianaceae* and *Liliaceae*[16].The species listed above were present in greater or lesser proportion within the palynological samples.

From specific bibliography we learn that throughout the Bronze Age the main grain crops exploited were wheats and barleys. In many areas these were supplemented by pulses, peas and

beans, and by other edible plants that were gathered wild rather than cultivated. A wide range of fruits and berries was also exploited, as evidenced by a number of well-preserved wet sites. At certain times other grains were also important, and oil plants usually played a role as well[17].

ARCHAEOBOTANICAL DATA

During excavation season carried out in 2017 campaign was applied the systematic and judgmental sampling strategy for macro remains recovery. In this campaign were sampled 27 soil plastic bags of 40 litres (four buckets of ten litters). That means was processed through flotation approximately 1000 litres of soil. But also, were small samples recovered directly from vessels. All the soil samples have been sorted with the help of water flotation barrel (made after Ankara model design). Soil samples were washed under running water machine with three different sieves of 2mm, 1mm and 0,5mm meshes. The plant macrofossils have been 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[18]. In this paper the plant nomenclature follows Flora României (Romanian Flora I-XII).

TRENCH 5 - BUILDING A21

During excavation performed in 2017 the most remarkable discovery comes from Trench 5 from a cultural level belonging to Gava culture from LBA (Fig. 2). It was revealed a building of 9x6m (A21) in situ with several vessels (one of them full of seeds) and other important finds (Fig. 3)

The archaeologists who made the excavation described it as such[19]: *"the cultural layers are formed of strata both of clayish consistence and loose ashy fill from the destruction of the rampart and palisade. This debris sealed the remains of the rampart and the adjacent surface building making both these features very well preserved. Building A21 measures 9x6 m and is oriented E – W. Most of the building is found within the trench and only part of the E wall extends outside the excavated surface. The building's floor is not flat and varies in depth between 0.80 to 1.5 m probably due to compression underlying features. Two fire installations (A23 and A 24) were found just outside the NW corner of A21. The W part of the building was used as a storage area which contained several vessels with burnt seeds, two stone grinders and 30 large loom weights (A22). A well-preserved wall section (A29), ca 120 x 150 cm was preserved on the floor of the building. This find is quite informative from an architectural standpoint as it clearly shows how the wall was constructed by vertical sticks and small horizontal beams clad by daub. The building's walls were built around two rows of stake holes with diameters between 0.10-0.15 m. A larger posthole (A32) for*

[12] UHNER *et alii* 2019, 177.
[13] UHNER *et alii* 2019, 178.
[14] BODNARIUC *et alii* 2002, 1480.
[15] TANȚĂU *et alii* 2006, 55.
[16] TANȚĂU *et alii* 2006, 56.
[17] HARDING 2010, 19.
[18] We also used the on-line available *Digital Atlas of Economic Plants in Archaeology*. The nomenclature used in this article is based on Zohary and Hopf (1988) but also Flora României (Romanian Flora I-XII).
[19] CIUGUDEAN *et alii* 2018, 137-138.

Fig. 2. View from Jidovar hill of the Trench 5 (apud CIUGUDEAN *et alii* 2018, Fig 4, 384).

Fig. 3. Building A21 from Trench 5 (view from west) (apud CIUGUDEAN *et alii* 2018, Fig 7, 386).

Fig. 4. Detail with vessels discovered near the western edge of building A21 (apud CIUGUDEAN *et alii* 2018, Fig 7, 386)

holding up the roof was located near a large oven (A30) in the E part of the building. Among the materials found there are ceramic vessels, a large number of zoomorphic and anthropomorphic figurines, miniature wheels, sling shots and loom weights, bone pins, stone grinders and pestles, as well as metal implements made from bronze, iron and gold."[20]

From Trench 5 have been recovered approximately *62.209* charred macroremains. Among 27 samples only 18 samples generated macroremains. From building A21 strata have been picked 14 samples from which were recovered 60.105 specimens (Fig. 4). Numerical and statistical analysis was based on numbers of plant remains derived from the number of entire remains added to half of the fragments. *Panicum miliaceum* predominate in samples from T5 and was independently stored, followed by *Triticum monococcum*, *Triticum dicoccum* and *Triticum spelta*. Barley, *Hordeum vulgare* (hulled) and *Vicia faba* were secondary species of some importance and were stored as well. Other possibly stored specie was *Lens culinaris* revealed by few cotyledons. We give below a detailed description of the number of revealed species in order of their prevalence.

Panicum miliaceum occurred in four samples with 45.699 specimens, the larger quantity was found in sample 11 (A21-PL-3-11) picked directly from vessels in four small plastic bags with weigh of 578 grams containing 38.533 specimens.

Triticum monococcum occurred in nine samples with 5907 specimens, the larger quantity was found in sample no. 13 (A21-PL-3- 13) with 5693 specimens.

Triticum dicoccum occurred in three samples with 4833 specimens, the larger quantity was found in sample no. 13 (A21-PL-3- 13) with 4269 specimens.

Triticum spelta occurred in six samples with 2975 specimens, the larger quantity was recovered from sample no.12 (A 21-PL-3-12) with 1916 specimens.

Hordeum vulgare occurred in four samples with 414 specimens, with 385 seeds recovered from sample 11 (A21-PL-3-11). It was picked directly from vessels context.

Vicia faba occurred in five samples with 281 specimens, the larger quantity was recovered from sample no. 4 (A21-PL-3-4) with 276 seeds.

The heaviest was sample no. 13 with weigh 3,532 grams (A21-PL-3-13) containing 14.233 specimens (einkorn 40%, emmer 30%, millet 30%).

Total number of charred macro remains recovered from vessels and surrounding contexts is approximately 60.105 specimens.

Even though the number of millet seeds is very high compared to other species, should be consider that a millet panicle extremely contains many small seeds. A panicle contains between 600- 1200 caryopses, and 1000 seeds weigh between 4 and 9 grams[21].

To millet the inflorescence is a panicle with 4-19

[20] CIUGUDEAN *et alii* 2018, 138.

[21] DE WET 2006, 165.

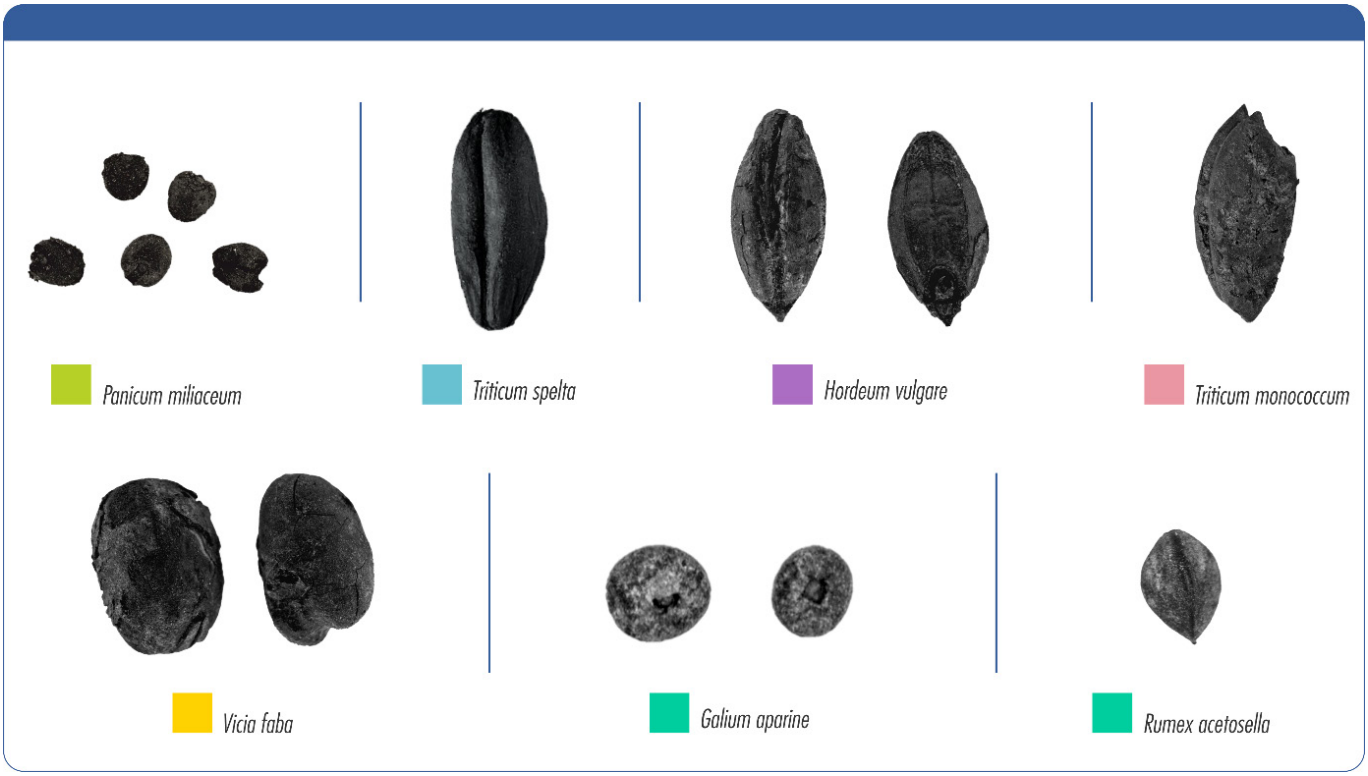

Fig. 5. Charred macroremains recovered from A21/Trench 5.

finger-like spikes that resembles a fist when mature, hence the name finger millet[22]. The spikes bear up to 70 alternate spikelets', carrying 4 to 7 small seeds[23].The seed pericarp is independent from the kernel and can be easily removed from the seed coat.[24]

An overview of harvest from building A21, revealed that cereals were initially cleaned of weeds and later stored in ceramic vessels. However, few ruderal species like *Galium aparine* (with 26 seeds) and *Rumex acestosa* (with 2 seeds) were discovered in samples from building A21 (Fig 5). Moreover, the stone grinders and pestles discovered in building A21 should be corelated with cereals from vessels. They were certainly used in process of grinding.

DISCUSSIONS

The results of archaeobotanical research in Teleac hillfort suggests that in the Late Bronze Age agriculture was based mainly on millet, einkorn, emmer, spelta, barley and some pulses. The percentage of species can be seen as a chart (Fig 6).

The archaeobotanical data obtained are very important. There are important not only by the large number of seeds revealed but also by the importance of the contexts in which were discovered. The archaeological context preserved by fire in building A21 from T5 where were discovered the impressive quantities of charred seeds stored in ceramic vessels is a remarkable one. For Romania and surrounding areas, it is a unique discovery made not only by archaeobotanical point of view, but archaeologically, too.

Statistically, A21 from Trench 5 has offered a most important quantity of macroremains. This special context helps us to understand how human communities from LBA stored the seeds required for sowing in the succeeding year and which species were included in their daily diet. Certainly, building A 21 is a special context. As we already mentioned the presence of grinders nearest to vessels with seeds can certainly be corelated.

According to the archaeologists it seems that the building A21 had a double functionality (domestic and metal workshop) because, on the eastern part were discovered several features that could be related to the metallurgical activity: pit A32/77 and kilns A30 and A33[25].

In Teleac, the small seeds belonging to broomcorn millet have been found in every Late Bronze Age context. About domestic millet we find in archaeobotanical studies that is becoming predominantly in Europe only from Late Bronze Age being a late comer from the cereal's category[26]. Common millet ranks among the hardiest cereals. It is a warm season plant which stands up well to intense heat, poor soils, and severe droughts, and very important completing its life cycle in a very short time (60-90 days) and succeeding in areas with short rainy seasons[27]. Broomcorn millet was used for making porridge in past times[28].

A compilation studies[29] demonstrated that the transformation of millets from minor to major crops took place in the transition from Middle to Late Bronze Age in Europe. Broomcorn millet became important in many of

[22] DE WET 2006, 165.
[23] DIDA *et alii* 2006, 335-337.
[24] QUATTROCCHI 2006, 48-53.
[25] CIUGUDEAN *et alii* 2018, 144-146.
[26] RENFREW 1973, 99.
[27] ZOHARY/HOPF 1988, 76.
[28] RENFREW 1973, 101.
[29] STIKKA/HEISS 2013b 362.

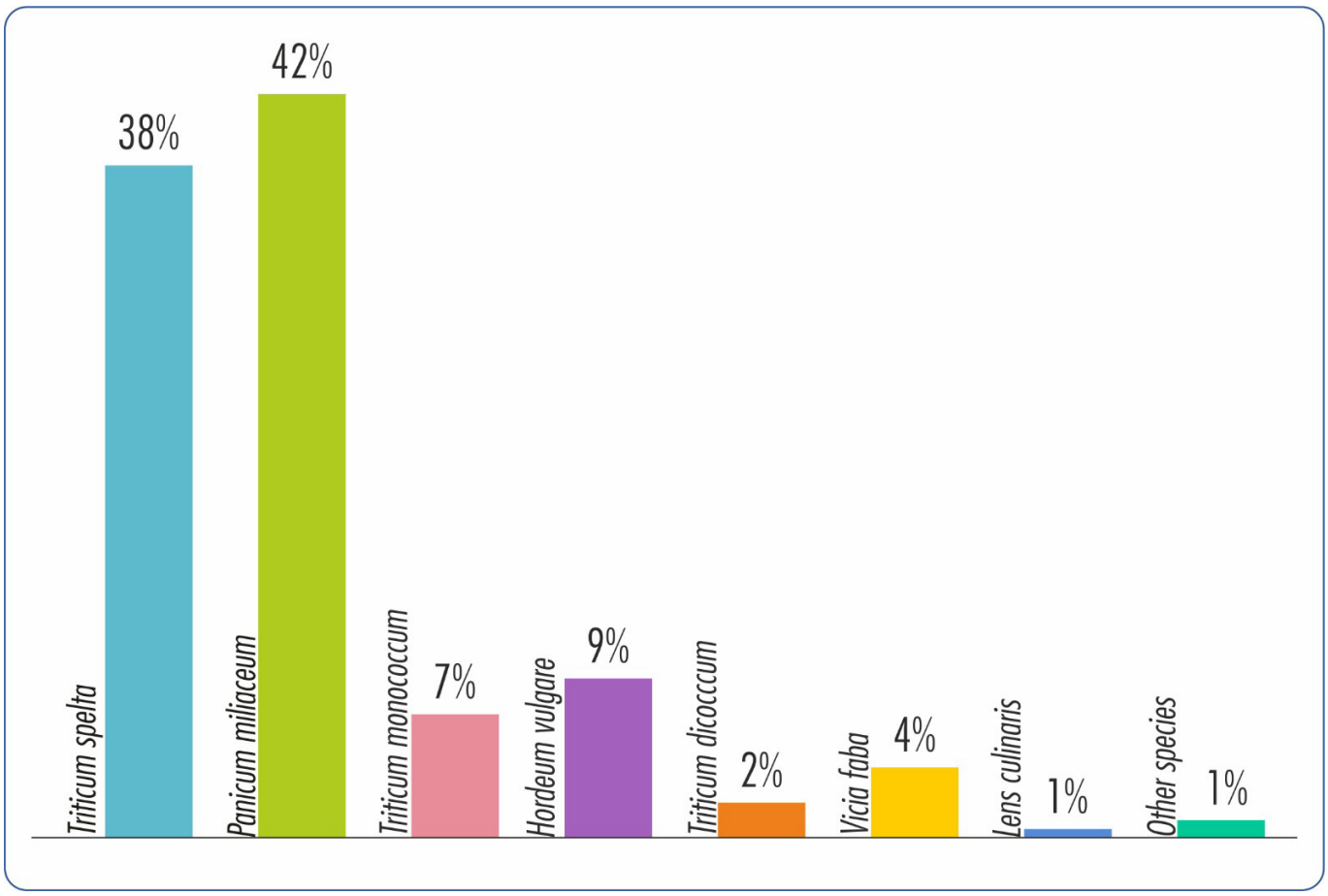

Fig. 6. Graphic chart with percentages of species from A21/T5.

the evaluated regions[30]: Greece and southern Bulgaria, the Pannonian Basin, the Alps and their foreland[31], western central Europe, and in Italy.

Regarding the presence of *Triticum monococcum* in LBA contexts we must say that it is a surprise because as we know since Bronze Age its importance has declined gradually, very likely because of the competition from free-threshing wheats. In the past einkorn cultivation was more extensive. This wheat was one of the founder grains crops but einkorn is a small plant, rarely more than 70 cm high, with a relatively low yield but it can survive on poor soils where other types fail. The fine yellow flour is nutritious but gives bread of poor rising qualities. Thus, einkorn has been consumed primarily as porridge or as cooked whole grains[32]. Although it is a relic crop, einkorn wheat is still present in the Romanian flora, being cultivated mainly in Transylvania, in mountain areas, mostly in the Apuseni Mountains[33].

Einkorn, emmer, as well as spelt 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, ("modern") bread 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[34]. 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[35].

During LBA, broomcorn millet (*Panicum miliaceum*) and gold-of-pleasure (*Camelina sativa*)[36] 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[37].

According to specialists who made the research 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[38]. Among the contemporary sites with Teleac with rich finds of millet are two sites: Archondiko and Angelochori[39],

[30] FILIPOVIC *et alii* 2020, 12.
[31] STIKKA/HEISS 2013b, 363.
[32] ZOHARY/HOPF 1988, 28.
[33] SĂVULESCU *et alii* 1957, 76.
[34] POPOV *et alii* 2018, 268-272.
[35] VALAMOTI *et alii* 2019, 106.
[36] STIKKA/HEISS 2013b, 349.
[37] GUSTAFSSON 1998, 67-69.
[38] VALAMOTI 2013, 54-60.
[39] VALAMOTI 2013, 78.

whereas in Kush Kaya it appears as a dominant crop along with hulled wheats.[40]

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[41].

From early to late Bronze Age, crop spectrum somewhat varies perhaps due to manuring the fields with fertiliser. Soil fertility was high in the tableland for cultivating the main crops, einkorn and barley, as well as the pulses lentil and pea, as an important protein source when human eating consisted mainly of vegetable food. In addition, growing pulses contributes to soil productiveness. The list of cultivated plants is long for the middle Bronze Age period, and the highly diversified species mix displays the availability of a wide range of crops coming from the Balkans and the Near East. While food in the Scandinavian sites generally depended on meat, the inhabitants at the Pannonian, Romanian and Mediterranean sites seem to have based their diet mainly on plant resources[42].

Modifying in existence tactics, recognizable from an analysis of archaeobotanical assemblages in a diachronic view, can ascend from numerous causes related to the environmental, technological, cultural, social and, not least, symbolic spheres. A combined tactic, in which the shifting groupings of plant macroremains are considered in the light of climatic and environmental variations as well as socio-cultural dynamics, may consequently shed some light on the fluctuations detected in food habits[43] .

If we compare the results of archaeobotanical study from Teleac hillfort with those of contemporary Late Bronze Age sites from east, south and central European area, we find they fit very well with other discoveries from contemporary sites[44]. *Panicum miliaceum* specie it maintains its predominant position in the preferences of human communities during this time almost everywhere in Europe but seems that our archaeobotanical profile fits very well with sites from Pannonian Basin[45].

We may say, as a general conclusion, that the most important staples discovered in the surface building A21 were *Panicum miliaceum* and *Triticum spelta*. 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. It looks that the crops were grown in pure stands.

[40] POPOV *et alii* 2018, 270.
[41] STIKKA/HEISS 2013b, 363.
[42] STIKA/HEISS 2013a, 85.
[43] PRIMAVERA *et alii* 2017, 83.
[44] VALAMOTI 2013, 55-56; STIKKA/HEISS 2013a, 77-79; 2013b 362-365.
[45] SZEVERENY *et alii* 2015, 105-109.

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