EPHEMERIS NAPOCENSIS

XXXII
2022

EDITURA ACADEMIEI ROMÂNE

EPHEMERIS NAPOCENSIS

XXXII
2022

ROMANIAN ACADEMY
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În ţară revista se poate procura prin poştă, pe bază de abonament la: EDITURA ACADEMIEI ROMÂNE, Calea 13 Septembrie nr. 13, sector 5, P. O. Box 5–42, Bucureşti, România, RO–76117, Tel. 021–411.90.08, 021–410.32.00; fax. 021–410.39.83; RODIPET SA, Piaţa Presei Libere nr. 1, Sector 1, P. O. Box 33–57, Fax 021–222.64.07. Tel. 021–618.51.03, 021–222.41.26, Bucureşti, România; ORION PRESS IMPEX 2000, P. O. Box 77–19, Bucureşti 3 – România, Tel. 021–301.87.86, 021–335.02.96.

EPHEMERIS NAPOCENSIS

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DTP şi tipar: MEGA PRINT
Coperta: Roxana Sfârlea

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Calea 13 Septembrie nr. 13, Sector 5, Bucureşti 76117
Telefon 021–410.38.46; 021–410.32.00/2107, 2119

ACADEMIA ROMÂNĂ
INSTITUTUL DE ARHEOLOGIE ŞI ISTORIA ARTEI

EPHEMERIS NAPOCENSIS

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EDITURA ACADEMIEI ROMÂNE

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NEW ARCHAEOBOTANICAL DATA FROM *VILLA RUSTICA* AT OARDA-BULZA (ALBA COUNTY). THE 2021 CAMPAIGN*

Beatrice Ciută[1], Mariana Egri[2]

Abstract. *New archaeobotanical data from villa rustica at Oarda-Bulza, located in south-western Transylvania, indicate that free-threshing wheat, Triticum aestivum (also known as bread wheat), was apparently the focus of farming activities, in contrast to pre-Roman times, when a more diverse agricultural crops system included greater amounts of emmer, barley and pulses. In addition to bread wheat remains, another important discovery is a cluster of charred seeds of Cannabis sativa (hemp) from the main building of the estate. These discoveries provide new information regarding the species cultivated and consumed by the community that lived in the area.*

Keywords: *charred plant remains, bread wheat, hemp, villa rustica, Roman Dacia*

Introduction

The article is discussing a new set of macrobotanical remains which have been identified in soil samples taken from different archaeological contexts associated with the Roman *villa rustica* at Oarda-Bulza (Alba County) during the 2021 archaeological campaign. These are adding to the results of analysing the first set of similar samples collected during the 2019 archaeological campaign, which have been published last year[3].

The *villa rustica* at Oarda-Bulza (Fig. 1) is the first major agricultural estate from Roman Dacia which has been systematically investigated using an interdisciplinary approach. After a comprehensive evaluation of the site, which has been carried out in 2018, systematic archaeological excavations have started in 2019, targeting the main building of the estate, conventionally named A, and some of its annexes. The multi-annual work-plan and its objectives are primarily informed by the fact that rural sites of this kind must have functioned as nodes of some complex networks of social, cultural and economic interactions that marked the gradual process of provincialization in Dacia after the Roman conquest, involving not only the surrounding rural environment, but also the nearby urban and military settlements.

Therefore, one of the objectives of these interdisciplinary investigations is to discuss the social, cultural and economic roles of the *villa rustica* at Oarda-Bulza, which functioned in the hinterland of the most important conurbation from Roman Dacia. This includes a comprehensive analysis of the agricultural and animal husbandry practices, and of the diet and culinary habits of the owners and their workforce, using a number of context-based, interdisciplinary

* This work was supported by a grant of the Romanian Ministry of Education and Research, CNCS-UEFISCDI, project number PN-III-P4-ID-PCE–2020-0566, within PNCDI III.

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[3] CIUTĂ/EGRI 2021.

investigations that take into consideration several categories of archaeological, historical, topographic and environmental evidence.

The 2021 archaeological investigations have targeted both the main building A and the largest of the three granaries provisionally identified through aerial photography and geophysical surveys, conventionally named C[4].

Archaeological context

In the main building A, the 2021 archaeological investigations[5] have targeted the south-eastern corner, where the excavations of 2019 already unearthed an apsidal room having a raised floor, which probably served as a *triclinium* during the second and third construction phases of the *villa*, as well as three other rectangular rooms, a part of the eastern outer courtyard and some of the enclosure ditch of the first construction phase. The aim has been to investigate the eastern half of the 5th century AD dwelling identified in the previous campaign, which partially superposed an earlier-dated storage/processing area (Fig. 2) located to the north of the apsidal room, as well as other rooms from the same area, while also expanding the excavation of the eastern outer courtyard. These investigations clarified a number of aspects regarding the relative chronology of the building, the most likely functions of some of the unearthed rooms, as well as the fate of this area at the end of the first construction phase, dated to the middle of the 2nd century AD or immediately after that. It is now quite clear that the building was smaller during the first construction phase, being significantly enlarged during the second phase in the second half of the 2nd century AD, when the ditch of the first enclosure was filled up to increase the available space.

From the archaeobotanical perspective, it is worth noting that a major fire, which destroyed this area of the main building A at the end of the first phase, enabled the outstanding preservation of a significant number of charred macrobotanical remains, while the two other construction phases of the Roman provincial period, which are not showing any burning traces, produced a much smaller number of macrobotanical remains.

The archaeological investigation of the largest granary, conventionally named C, has started during the 2021 campaign, targeting the north-eastern corner. It has to be noted that its structure and architectural features are poorly preserved mainly due to the modern agricultural works, especially the use of heavy machinery and deep ploughing, and this is also affecting the availability of reliable soil samples dated to the Roman provincial period. Besides that, the excavations also revealed the existence in the same area of a settlement belonging to the Cugir-Band group, dated to the Late Bronze Age[6], which was partially damaged by the foundations of the Roman granary.

The presence of this settlement under the granary has required some changes in the sampling strategy, in order to maximize the potential number of reliably-dated soil samples belonging to each chronological horizon. That includes the retrieval of a higher number of smaller samples from clearly delimited key contexts that show no traces of cross-period contamination. However, none of the soil samples recovered from secure Roman provincial contexts in the granary C during the 2021 archaeological campaign produced any macrobotanical remains, while only one sample taken from a context belonging to the Cugir-Band settlement produced

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[4] These investigations are part of the *Apulum Roman Villa Project* which is co-financed by the SSHRC Canada, the Romanian Ministry of Culture, and Alba County Council through the MNUAI. See further RUSTOIU ET AL. 2020a; 2020b; 2021; 2022; McCARTY ET AL. 2021.

[5] RUSTOIU ET AL. 2022.

[6] For the Cugir-Band group discoveries in Transylvania and their dating, see CIUGUDEAN ET AL. 2019.

a small number of cereal grains fragments. This is most likely caused by the generally poor preservation conditions on site whenever the sampled context is not bearing any traces of fire.

As a consequence, the macrobotanical remains discussed in this article come exclusively from contexts belonging to the area of the main building A, more precisely to its first construction phase.

Methodology

As previously mentioned[7], the team has developed a rigorous strategy of excavation, registration, sampling and analysis, in order to recover as much information as possible about the diet and agricultural practices of the inhabitants of the Oarda-Bulza estate. This includes the systematic retrieval of soil samples for archaeobotanical, palynological and micromorphological analyses, and of the faunal and charcoal remains from all archaeological contexts. The organic remains retrieved from various containers, tools and installations are also going to be taken into consideration. The results of these investigations will be combined with those obtained through the contextual analysis of specific artefacts, in order to reconstruct the culinary and convivial practices of different categories of inhabitants, as well as the nature of the agricultural activities taking place on site.

For the identification of macrobotanical remains, the first step has involved the retrieval of ca. 10 L of soil from each archaeological context, the exact location of each sample being geo-referenced using a dGPS. In some cases in which the contexts were quite large or/and thick, one example being context **[1109]** representing the burnt floor of the storage/processing area, more than one soil sample has been collected in order to understand the processes that contributed to their formation and the associated human activities. Each sample has been packed in a clean plastic bag and labelled before being geo-referenced and registered in the site's database. The soil samples retrieved for macrobotanical analyses have always been paired with palynological and micromorphological samples taken from the same context and position. This will allow the identification of different relevant categories of environmental evidence and a systematic comparison of the results obtained through different analytical methods.

All soil samples for macrobotanical analyses have been processed using a water flotation barrel whose design is similar to the so-called Ankara machine. The samples have been sieved under running water using three different sieves having a 2 mm, 1 mm and 0.5 mm mesh. 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[8].

Seven soil samples have been retrieved from the main building A, but only three samples contained charred macrobotanical remains, mostly belonging to the *Cerealia* family (over 700 grains and fragments). Broomcorn millet, hemp and some rudero-segetal species are also attested (see Table 1). A charred cluster of hemp seeds has been recovered through dry sieving of the soil from context **[1104]**, a procedure that has been systematically used for all archaeological contexts on site. It has to be noted that the charring of plant remains could occur on ancient sites when the organic matter comes in contact with the fire in anoxic conditions[9]. The aforementioned context is a levelling layer consisting of the burnt debris of the first construction phase in the south-eastern corner of the main building A.

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[7] CIUTĂ/EGRI 2021.

[8] The plant nomenclature follows *Flora României* (SĂVULESCU 1952, I–XIII) and also ZOHARY ET AL. 2012.

[9] JACOMET 2007, 2387.

This is a summary of the identified macrobotanical remains:

Cerealia:
Triticum aestivum: 556 caryopses and 144 caryopses fragments;
Panicum miliaceum: 21 caryopses.

Oleaginous plants:
Cannabis sativa: one charred cluster of seeds.

Rudero-segetal:
Galium aparine: 12 seeds;
Chenopodium album: 3 seeds.

Contextual analysis

As previously mentioned, all soil samples that produced macrobotanical remains and are dated to the Roman provincial period are coming from contexts belonging to the first construction phase of the main building A.

Sample **P146** has been taken from context **[1104]**, which is a levelling layer consisting of the burnt debris of the first construction phase in the south-eastern corner of the main building A. This layer sits on top of context **[1109]**, which is the burnt floor of a light storage/processing structure (Fig. 2), perhaps a shed abutting the easternmost wall of the main building. Two samples (**P149** and **P149'**) have been taken from different areas of the floor, but none produced any macrobotanical remains, most likely due to the powerful fire which apparently destroyed everything. On the other hand, the burnt debris on top of it enabled the complete charring of some plant remains, which have been picked up in **P146**. The assemblage includes 55 grains of the *Cerealia* family (bread wheat and broomcorn millet) and 10 seeds belonging to weeds (cleavers and goose foot) commonly associated with the cultivation of cereals (Table 1). Their presence in a context associated with a storage/processing area seems to suggest that the two types of grains were regularly consumed by the inhabitants of the *villa*. It is worth noting that similar types of cereals have also been identified in soil samples retrieved from the fill of the enclosure ditch of the first construction phase, which is located in the close vicinity of the same part of the building[10].

From the same context **[1104]** was retrieved through dry sieving a charred cluster of hemp (*Cannabis sativa*) seeds weighing 5.8 g (Fig. 3). The cluster **P145** has an almost globular shape, with an average diameter of 26 mm, and a shiny black colour with some apparently vitrified spots. It seems that the oily core of the seeds vaporized rapidly during the burning process, leaving only the seeds coat intact due to its high cellulose content. It has been assumed that the oilseeds have a very small chance of preservation in a charred state due to their high oil content, that is, when exposed to high temperatures during charring, the highly inflammable oil vapours would lead to the rupture of the seeds and to their complete combustion, leaving no traces for the archaeobotanists to identify[11]. However, some recent laboratory-based experiments have demonstrated that *Cannabis sativa* seeds have in fact a quite good chance of getting carbonized in archaeological contexts due to their thick seed coat, which can get blackened and hard rather rapidly especially in limited oxygen or anoxic burning conditions, when the seeds can withstand temperatures as high as 700°C[12].

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10 CIUTĂ/EGRI 2021, 143.
11 STIKKA/HEISS 2013, 78.
12 MÄRKLE/RÖSCH 2008, 261.

These results are further confirmed by the discovery of charred hemp seeds in different archaeological contexts dated to the Roman period, for example in a probable storage room at Sagalassos (Turkey)[13], in wine presses at Erden (Germany), as well as at Trier, Neuss, Butzbach and Otterbach (all in Germany)[14], and at Pompeii (Italy)[15].

Archaeobotanical and palynological analyses have shown that the earliest cultivation of *Cannabis sativa* in Europe can most likely be dated to the Bronze Age, starting with the Yamnaya culture, if not earlier to the Copper Age in south-eastern Europe, being then spread first by the Scythians and later by the Romans towards central, western and northern Europe[16]. During the Roman Empire, some ancient authors mention the cultivation and processing of hemp for fibre to make ropes and sails, and also as a medicinal plant, though they were also aware of its psychoactive properties[17]. At the same time, some archaeological contexts from Gaul and the Rhine region seem to suggest that hemp seeds were also pressed to extract oil or were crushed and added to certain dishes[18].

The cluster of charred hemp seeds from the *villa rustica* at Oarda-Bulza is the first discovery of this kind in Roman Dacia. Other similar examples have been identified in the settlement at Răducăneni-Zagoina (Iaşi County), dated to the 4th–3rd centuries BC[19], and in the Dacian settlement at Popeşti, though the precise archaeological context of the latter and its dating are unknown[20]. During the 2nd – 3rd centuries AD, hemp stem fragments are attested in some indigenous settlements from *Barbaricum* to the east and south-east of Roman Dacia[21]. The presence of stem fragments in several pits indicates the practice of retting to obtain fibres among these communities. A significant quantity of charred hemp seeds has also been recovered from a broken vessel found in a pit from the settlement at Năeni-Zănoaga (Buzău County), which was dated to the 4th century AD[22].

Two samples labelled **P147** and **P147'** have been taken from context **[1114]**, which is the fill of a pit **[1115]** dug into the same burnt floor **[1109]** belonging to a light storage/processing structure probably abutting the main building A during the first construction phase. The circular pit has a diameter of 0.46 m and a depth of only 0.25 m. While the soil sample taken from the bottom of the pit contained no macrobotanical remains, the one consisting of the proper fill of the pit contained a large number of *Triticum aestivum* grains and fragments (Fig. 4), as well as five seeds of cleavers (*Galium aparine*), which is a rudero-segetal species commonly associated with cultivated fields.

The pit **[1115]** is the largest of a row of three similar features (Fig. 2) which were initially presumed to be setting pits for large ceramic storage vessels (*dolia*). However, the presence of many small rock fragments in the soil samples seems to suggest that the circular pits could have served as foundation pits for the bases of rotary querns. Though the exact type of these rotary querns cannot be identified, the diameters of the three pits (0.46 m; 0.39 m; 0.27 m) fit into the range of dimensions attested for the so-called cylindrical or "Celtic" quern, consisting of a runner (*catillus*) and a lower stone (*meta*), which was used in continental Europe since the

13 WAELKENS ET AL. 2013, 180, fig. 4.
14 KÖNIG 1994; 2017, 115–116, fig. 5; WIETHOLD 2012, 318.
15 MERCURI ET AL. 2002, 264.
16 MERCURI ET AL. 2002; MCPARTLAND/HEGMAN 2018; MCPARTLAND ET AL. 2018.
17 MERCURI ET AL 2002, 264, with a list of ancient written sources.
18 KÖNIG 1994, 43–44; WIETHOLD 2012, 318.
19 MONAH 1988, 304, figs. 1/7 and 2/2, 7.
20 CÂRCIUMARU 1986, 131; 1996, 148, pl. 16/6.
21 CÂRCIUMARU 1996, 59–60.
22 CÂRCIUMARU 1996, 181, pl. 16/7.

Late Iron Age and throughout the Roman imperial period[23]. A fragmentary *meta* with an estimated diameter of 0.42 m has been found in secondary position in the area of the main building A at Oarda-Bulza during the 2019 archaeological campaign (Fig. 5).

In most cases, such rotary querns are not discovered *in situ*, the broken millstones being often reused as building materials or levelling fillers. An almost complete *catillus* and fragments of a *meta* have recently been discovered in a building from the *canabae* at Apulum, which might have served as a cooking and foodstuff storage facility for soldiers[24].

A "battery" of three rotary querns is rather unusual for a household, given that in the Roman army a *contubernium* was normally issued with a single medium-sized quern[25]. However, the size of the *villa rustica* at Oarda-Bulza indicate that even during the first construction phase the number of inhabitants most likely was higher than that of an average household, so the necessary daily quantity of flour was significantly higher. A number of experiments conducted on Late Iron Age and Roman rotary querns have suggested a production rate of about 4 kg per hour for an experienced operator, though some ethnographic evidence points to a lower output rate of 1.5–2 kg per hour. This variability is most often influenced by the type of cereals that are milled and the desired quality of the flour[26].

Concluding remarks

The exclusive presence of *Triticum aestivum* in the archaeological context **[1115]**, which was most likely associated with a rotary quern, and the predominance of this species among the cereals identified in the main building of the *villa rustica* at Oarda-Bulza, indicate that it was the preferred source of the flour consumed by the inhabitants, even if other types of wheat and other cereals are also attested[27]. It might be therefore presumed that the so-called bread wheat was the main focus of farming activities, in contrast to pre-Roman times, when a more diverse agricultural crops system included greater amounts of emmer, barley and pulses.

A number of recent studies have shown that the cultivation of *Triticum aestivum* increased significantly in continental Europe during the Roman imperial period and many large provincial estates were specialized in this kind of crops, cultivated especially on very fertile soils[28]. In the hinterland of Apulum, the most likely client for this specialized production of bread wheat was the Roman army, alongside the urban population. While the Romans consumed different types of wheat, *Triticum aestivum* was preferred for bread baking because the available milling technology could yield the desirable fine high-gluten flour[29].

Another important result is the identification of hemp remains for the first time in Roman Dacia. Their presence points to the local consumption of this type of oilseeds, either as oil or as seed meal in combination with other ingredients, if not to its possible cultivation on the estate.

The macrobotanical remains identified during the 2021 archaeological campaign and their contexts of discovery have expanded our knowledge regarding the diet and agricultural practices of the inhabitants from the *villa rustica* at Oarda-Bulza, also hinting at some possible economic relations with the Roman army. More soil samples have been collected in the 2022 archaeological campaign, not only from the main building A, but also from the annexes, and

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23 PEACOCK 2013, 65–68; SHAFFREY 2003; 2015; WENZEL 2020.
24 CIUTĂ/TIMOFAN 2013, 193, figs. 7 and 8.
25 PEACOCK 2013, 153.
26 PEACOCK 2013, 127–130.
27 CIUTĂ/EGRI 2021, Table 1.
28 WILKINS/HILL 2006, 112; REED ET AL. 2019, 624.
29 THURMOND 2006, 20.

their upcoming analysis, together with the palynological, anthracological, micromorphological and biochemical analyses, will be able to shed light on the so far poorly understood social and economic practices from the rural hinterland of Roman Apulum.

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Table 1. Plant species identified in soil samples from the main building A at Oarda-Bulza

Species	**P145 [1104]**	**P146 [1104]**	**P149 [1109]**	**P149' [1109]**	**P147 [1114]**	**P147' [1114]**	**Total**
Cerealia							
Triticum aestivum		34 grains			522 grains + 144 frgs.		556 grains + 144 frgs.
Panicum miliaceum		21 grains					21 grains
Oleaginous plants							
Cannabis sativa	charred cluster of seeds						charred cluster of seeds
Rudero-segetal							
Galium aparine		7			5		12
Chenopodium album		3					3

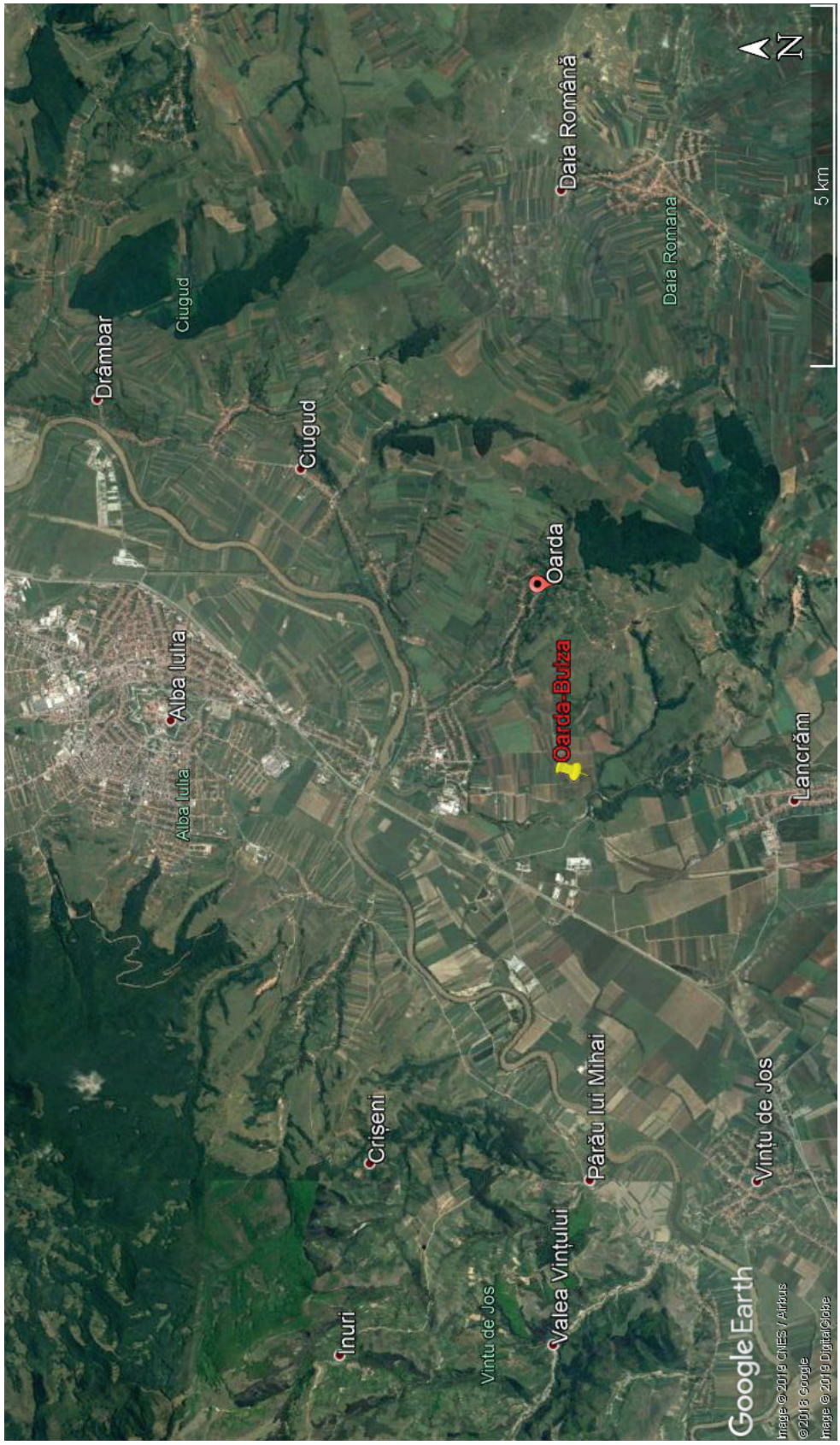

Figure 1. Location of the site at Oarda-Bulza (basemap Google Earth under licence CNES/Airbus).

Figure 2. Burnt floor **[1109]** of the storage/processing area in the main building A, with the three pits **[1111]**, **[1113]** and **[1115]** for rotary querns bases before excavation (photo ARVP).

Figure 3. Microphotograph of the charred cluster of hemp (*Cannabis sativa*) seeds (photo ARVP).

Figure 4. Microphotograph of some of the bread wheat (*Triticum aestivum*) grains from sample **P147** (photo ARVP).

Figure 5. Fragmentary *meta* found in secondary position in the area of the main building A (photo ARVP).