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HISTORICAL ECOLOGICAL RESEARCH OF THE KURGANS OF HAJDÚNÁNÁS–ZAGOLYA-DŰLŐ

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Abstract: Kurgans are human-made geomorphological elements of the Eurasian steppe zone. In the Carpathian Basin, their construction is connected to the burial customs of Bronze Age societies. Their importance is multifold and it is not limited to their archaeological significance only. These monuments are also bearers of significant botanical, zoological, pedological and geomorphological values. Furthermore, they are key elements of the cultural heritage, representing unique aesthetical and cultural historical significance within the landscapes of the Great Hungarian Plain. In the close vicinity of Hajdúnánás, the so called Zagolya-dűlő gives home to multiple burial mounds. The history of this territory arches over – at least – five millennia, starting with the construction of these burial mounds. The current study focuses on the historical ecology of Zagolya-dűlő by integrating various environmental and historical sources. The environmental history of Zagolya-dűlő was researched through the paleoecological assessment of an excavated kurgan and through historical maps. Results of the land use history revealed that ploughing avoided the core territory of Zagolya-dűlő. The higher part of the area was used for grazing, while the depressions in the landscape were occupied by reed and marshy areas. The soilscape of Zagolya-dűlő is characterised by alkaline and chernozem soils today. Similar soil conditions are reflected by the buried soil found under kurgan ETA-01. In addition, the botanical survey of the kurgans revealed regionally significant natural value. The identified plant species indicate moderate human disturbance, which supports the results of the land use historical reconstruction.

Keywords: landscape history, burial mounds, Hajdúság, historical maps, paleopedology, botanical survey

1. Introduction

At the southwestern border of Hajdúnánás (Hajdú–Bihar county) an extensive pasture can be found, which is denominated as Zagolya-dűlő. The most significant landmark of the area is the Kis-Süldős mound. In the vicinity of this kurgan, further, unnamed kurgans were localised. The history of this territory arches over – at least – five millennia, starting with the construction of these burial mounds. The presence of both settled and nomadic societies was proven by the excavation conducted at kurgan ETA-01, where settlement remains of the Baden Culture and the burial of the Yamnaya Culture was discovered (Dani et al. 2017).

Due to the fact that kurgans provide soil and sediment archives useful to understand the Holocene environment (e.g. Demkin 2000; Makeev et al. 2021;

Khokhlova et al. 2020, 2022), the excavated kurgan, as well as its close vicinity, was surveyed through paleopedological, archaeobotanical and pedological proxies to be able to reconstruct the environmental setting of the area (Braun et al. 2022; Pető et al. 2022).

However, the land use history of the site and Zagolya-dűlő could only be completed via implementing the analysis of written sources, historic maps and the survey of the recent vegetation.

In order to complement the paleoecological data of the site, further investigations were undertaken, out of which the first results are presented here.

Figure 1: General view of Zagolya-dűlő. a) *Anacamptis morio*; b) typical alkaline soil of the territory.

2. Materials and methods

2.1. Methods of land use history analysis

In order to reconstruct the land use history of Zagolya-dűlő (*Figure 1*) both written sources and historic maps were investigated. The historical review of Hajdúnánás provided data on the agriculture-related use of the subjected territory (Orosz 1973). Historic maps of the First (1782–1785) and Second (1819–1869) Military Survey of the Habsburg Empire, as well as the Third Military Survey of the Austrian-Hungarian Monarchy (1869–1887) were used to trace the land use changes (Arcanum 2004a, b, c).

2.2. Methods of the botanical survey

The first botanical survey of Zagolya-dűlő focused on the vegetation of six kurgans (ETA01 to ETA06). All kurgans were visited and a total surface field survey was undertaken. Nomenclature and classification follows World Flora Online 2023.

3. Results

3.1. Results of the land use history analysis

The land use history focused on a wider area, not only on the kurgans themselves. The reason behind this, is that use and agricultural utilisation of Zagolya-dűlő affected the kurgans in general. The management and land use of Zagyolya-dűlő gives indication on how the kurgans were affected.

The city of Hajdúnánás belonged to the economic influential area of the town of Hajdúböszörmény. In general, the city centres in the Hajdúság region owned a significant agricultural territory, most of which was cultivated with spring wheat. The so-called cereal boom ended around the middle of the 17th century. There was no need for such intensive grain production as in the last third of the 16th century, which increased the proportion of grazelands (Orosz 1973). The spread of this management system – namely the increase of grazeland areas – became a characteristic feature of the outskirts of Hajdúnánás.

According to the First Military Survey maps, the majority of the outskirts of the settlement area consisted of arable fields, where the local communities produced cereals, essential for everyday life. However, the proportion of pastures and grazelands was not negligible either. To the east of the city centre, beyond the residential area, indications for smaller and a larger vineyard can also be sighted. It is also visible that on the western border of the settlement – in the area of the Zagolya-dűlő and the subjected kurgans – there were large marshy areas overgrown with reed stands.

The maps of the Second Military Survey reveal further land use information on the Hajdúnánás area. Similarly to the former state, the vast majority of the surrounding areas are subject to arable cultivation, although the area of Zagolya-dűlő is excluded from this, and pastures are documented (*Figure 2*). It is clearly visible on this map that Zagolya-dűlő is surrounded by three watercourses: the Varjas stream, the Szőke stream and the Süldős stream.

The area to the west of Zagolya-dűlő is still characterised by waterlogged, marshy territories and the presence of extended reed stands. Although not all the kurgans of the Zagoly-dűlő are denominated on this map. A few more visible and therefore marked kurgans can be seen on the map. The Süldős mound, the Keves mound, the Kis Vidi mound and the Nagy Róna mound are located to the south of the examined area, and to the north-east direction we find the Lopó mound.

The Third Military Survey map shows that the area towards the Kis-Süldős mound was used as pasture at that time, while the area west of the Süldős stream is indicated as meadow. A significant portion of the Zagolya-dűlő was still not affected

by arable activity and the area around the kurgans were used as pastures and meadows.

Figure 2: Zagolya-dűlő, south of Hajdúnánás, on the maps of the First (1782-1785) (a) and Second Military Survey (1819-1869) (b).

3.2. Results of the botanical survey

The mounds stand out from the surrounding saline landscape. A significant part of the surface of the better-preserved ones (ETA-01, ETA-02) is covered by loess meadow vegetation (Salvio nemorosae–Festucetum rupicolae) (habitat: closed steppes on loess) of medium natural value. In parts, where the soil surface is less disturbed, species of lowland dry grasslands appear (e.g. Salvia nemorosa (L.), Carex praecox (Schreb.), Poa angustifolia (L.), Galium verum (L.), Myosotis ramosissima (Rochel), Ranunculus pedatus (W et K), Verbascum phoeniceum (L.)).

Secondary vegetation covers the ETA-03 and ETA-04 kurgans with the dominance of Bromus hordeaceus (L.), Capsella bursa-pastoris (L.) (Medik.) and Lepidium draba (L.). These species are indicating degradation and are also present on the other mounds, but with much smaller coverage.

The vegetation of the ETA-05 and ETA-06 kurgans is of medium natural value. Some of the degradation-tolerant species of loess grasslands also occur at these locations (e.g. Buglossoides arvensis (L.), Galium verum (L.), Ornithogalum orthophyllum subsp. kochii (Parl.) (Zahar.)).

Weeds on the one hand are represented by herbaceous plants, typical of disturbed, degraded surfaces, and on the other hand by arable species that also occur in the surrounding fields. The most common weed species on the mounds are as follows: Bromus hordeaceus (L.), Capsella bursa-pastoris (L.) (Medik.), Lamium purpureum (L.), Leoidium draba (L.). Shrub growth is not typical on any of the mounds; only a few specimens of Crataegus monogyna (Jacq.) and Prunus spinosa (L.) could be observed.

4. Discussion

The first human appearance at Zagolya-dűlő is marked by the burial mounds of the Late Copper/Early Bronze Age Yamnaya society and the settlement remains of the Baden Culture (Dani et al. 2017). Paleopedological and botanical study demonstrated that the kurgans were built in an environment very similar to the present day one (Pető et al. 2022). The slightly alkaline soil excavated under the kurgan and the alkaline soil properties of the mound body is in good correlation with the recent soil properties of Zagolya-dűlő (Braun et al. 2022). The area of the ETA-01 kurgan was affected by 'cultural recycling', as not only the people of the Baden Culture settled here, but a Sarmatian burial and an Árpádian Age kiln was also detected on the topmost layer of the kurgan. Archaeobotanical studies showed that intensive cereal utilisation was present during the Early Medieval Ages, which might indirectly refer to the land use of the broader area, although cereal cultivation practice cannot be linked directly to Zagolya-dűlő. Information on land use is transmitted by written sources dealing with the economy of the later founded Hajdúnáns settlement.

It turns out to be very interesting that despite the significant changes in land use around Hajdúnánás, the Zagolya-dűlő and the area of the kurgans located in it were not brought under cultivation. The area has always remained a pasture or grassland,

which was greatly advantageous for the survival of the mounds here. The reason behind the poorly preserved quality of the mounds is probably due to a shorter period of arable cultivation that ended as a consequence of less favourable soil conditions.

. From a botanical perspective the vegetation of the ETA-01 mound is not one of the most valuable ones in the Great Plain, still, it represents regionally significant natural value. The vegetation of kurgans ETA-01 and ETA-02 is of medium natural value, the ruderal weed vegetation is subdominant. Some rare dry grassland species also appear on some of the mounds: Marrubium vulgare (L.), Ornithogalum orthophyllum subsp. kochii (Parl.) (Zahar.), Ranunculus pedatus (W et K).

The identified species indicate moderate human disturbance, which might be linked to grazing and mid/low-scale arable field management. Still, the present study clearly shows that despite the centuries-long human presence in the area, the mounds can preserve rare dry grassland species, therefore representing a habitat island function (Bede et al. 2022; Deák et al. 2016, 2021).

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