

## THE DISTRIBUTION OF THE GREAT MUSHROOM GRASS (*ANDROSACE MAXIMA* L.) IN THE GREAT PLAINS

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**Abstract** Our biological resources are decreasing worldwide. We live in an era of species extinction. Therefore, the reappearance of a species that has already disappeared is very important (Sih et al., 2000). The big mushroom grass (*Androsace maxima* L.) is a representative of disappeared vegetation in the Great Hungarian Plains. The big mushroom grass is a sub-Mediterranean flora element with a Eurasian distribution. It is protected in Hungary, its nominal value is HUF 10 000. Its natural occurrence can be observed primarily in the loess-covered areas in the Central Mountains in Hungary. It was observed secondarily in abandoned vineyards in the Balaton highlands. Thirdly, as a result of human interventions, we can find them in the mainly south-facing parts of kurgans and dam sides. The plant was first recorded on the side in the Gyoma section of the dam of the Triple Körös river in 2008, where it leads an isolated lifestyle. A study from 2008 to 2010 showed an increase in the number of individuals of the isolated population. Despite the significant fluctuation of the individuals of the sedge, the weed population was considered stable and able to spread. In our work, we will complete the 2024 census of the population. On the occasion of the first field trip, we take up observation points. Based on these, we concluded that the population is spreading, compared to the results of the previous study. After that, we finish counting the number of units using the square method. We made a patch map of the degree of spread. Our results confirm the spread of the population and a significant increase in the number of individuals. Due to the sub-Mediterranean nature of the plant, we can assume that its spread is linked to warmer weather. To this end, we also examined the data series of a nearby meteorological station regarding the vegetation period of the plant. During our study, we also measured the intensity of seed formation. From the size of the seed production, we can deduce the following population size. In order to monitor the population of the large mushroom grass, our tests will be repeated next year.

**Keywords**, big mushroom grass, loess-covered, loess vegetation, abundance, dominance

### INTRODUCTION

Habitat loss is the biggest problem threatening biodiversity. In Hungary, habitat loss and transformation processes due to human influence, such as the formation of settlements, the expansion of agricultural areas, water management (flood control, inland water protection), are processes that have already taken place. During these processes, the ancient nature of the Great Plain was completely transformed (DEMETER ET AL., 2022).

Our study area (the dam of Gyomaendrőd) falls within the large-landscape of the Great Plain and the small- landscape of the Békési-sík (DÖVÉNYI et al., 2008). Its soil is mainly covered with infused loess and clay (ENDRE et al., 2022). The climate of the area is located in the moderately warm and hot climate zone. The average annual temperature is 10.2-10.4 °C, during the growing season 17.1-17.3 °C. The annual amount of precipitation is 550-570 mm (PÉCZELY, 1998).

The dominant vegetation in the study area, forest-steppe-loess-steppe, has almost completely disappeared. Today, 95% of the area is dominated by arable land. A significant part of the areas was brought under cultivation, their soil was partially carried away, and the plants that make up the vegetation partially or completely disappeared (DÖVÉNYI et al., 2008). Some habitats preserving original plants can be found mosaic-like in the area of the Körös-Maros National Park. They provide shelter for many species forming associations. Nowadays, the oak trees association have disappeared. The natural forest associations are represented only by the bush grasses (*Salicetum triandrae*) and willow groves (*Salicetum albae-fragilis*). Among the open associations, sandy pastures (*Potentillo - Festucetum pseudovinae*; *Artemisio - Festucetum pseudovinae*) and loess grasslands (*Salvio-Festucetumsulcataetibiscense*) dominate (HOTROBÁGYI, SIMON, 2000). From the point of view of flora history and nature conservation, the flora of the loess lawn and loess wall is a natural habitat. The vegetation of the loess

meadows and dams is also a refuge, where the loess grass-forming plant big mushroom grass (*Androsace maxima* L.) was found again.

The big mushroom grass (*Androsace maxima* L.) can be observed in Hungary, in the loess-covered areas of the Central Mountains. It can also be found in the abandoned vineyards of the Balaton highlands (Zemplén, Börzsöny, Pilis, Buda Mountains (FARKAS 1999). Nowadays, we find it on artificial structures (dams, kurgans) (JAKAB-TÓTH 2003). In the Great Plain, their existence was recorded only in Gyomaendrőd, Hódmezővásárhely and Bölske (FARKAS, 1999). Outflowing rivers and many human activities may have played a role in the spread of the plant (DELI & LOMBMÁYER, 2011).

The big mushroom grass belongs to the genus (*Androsace spp.*) of the plant family (*Primulacaceae*). It is widespread in the sub-Mediterranean areas of Eurasia.

In the international literature, the big mushroom grass is mentioned as a plant that blooms from April to June (KIRÁLY, 2009). In Hungary, flowering lasts from March to mid-April. It is considered an annual pioneer plant. Its flowers originate from its rosette. The number of flower stalks is one or 2-3, and they develop in umbel-shaped inflorescences. Its leaves are ovoid with serrated edges. The flower stem and shoot are usually reddish-brown in color. The flower is small, pale purple or pink. The flower has boiled petals, and a yellow ring is located in the throat of its five-petaled petals. The fruit is a spherical capsule. The seed is triangular with a diameter of 2-2.5 mm (MOLNÁR, 2003).

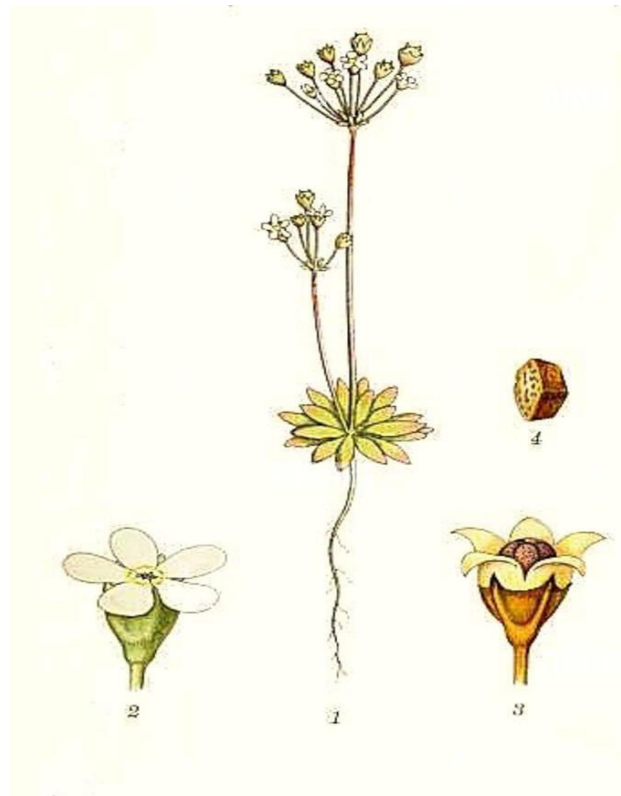


Figure 1.: Morphology of (*Androsace maxima* L.) (source: <https://www.i-flora.com/en/the-smartphone-apps/iflora-deutschland/species/art/show/androsace-maxima-1.html>)

## MATERIAL AND METHODS

The occurrence of big mushroom grass (*Androsace maxima* L.) in Békés County was recorded in 2008. On the left dam of the Gyoma section of the Hármas-Körös river, on its protected side, in western exposure. Currently, it is also cultivated surrounded by secondary mixed vegetation. Deli and Lobmayer conducted several years of research on the spread of the big mushroom grass (*Androsace maxima* L.). The area they examined is the section of the dam that leaves the northeastern part of Gyomaendrőd and starts from the public road (4232) going towards Dévaványa, as well as the area close to the gatekeeper's house.

In the present investigation, we are investigating the further spread of big mushroom grass (*Androsace maxima* L.) along the further section of the dam. In the course of the study, we examine the distribution, number and dominance of the plant. The obtained results are compared with the results of the previous survey. Furthermore, we try to explore the ecological conditions and conditions for the spread of the plant.

We went to the study area for the first time on March 18, 2024, when the occurrence points of the plant were identified. The marking points were measured using GPS (Garmin Oregon 750t) coordinates. The recording was carried out in the Danzug backwater. At that time, the phenological stage of the plant was the time of full flowering. We visited the area for the second time on 21. March. At the noted points, we carried out a population estimation survey in 12 repetitions. To determine the number of individuals, we used Balázs Újvárosi's coenological method. The counting was done with a 1\*1 m square. The results of the stem count were compared with the previously conducted survey. The phenological state of the plant was in the state of full flowering and the beginning of seed formation. To determine the dominance of the plant, we set up a scale of 1-3 scales. Level 1 of the scale confirmed the presence of the plant in small numbers. Level 2 of the scale means medium dominance of the plant. Level 3 of the scale expresses the dominance of the plant.

## RESULTS AND DISCUSSIONS

The aim of our study was to investigate the number and dominance of the big mushroom grass (*Androsace maxima* L.). During the first field trip, the plant was in the phenological stage of the beginning of flowering. The first observation site is the previously identified area to the east of the Gyoma dam 4232 road, as well as the population 150 meters from it. Moving on, the plant occurred again in the bounded section of the Torzsás and Danzug backwaters on the dam side. Since this place is not mentioned in previous literature, we marked its plant occurrence with GPS points. look at the 2. image.

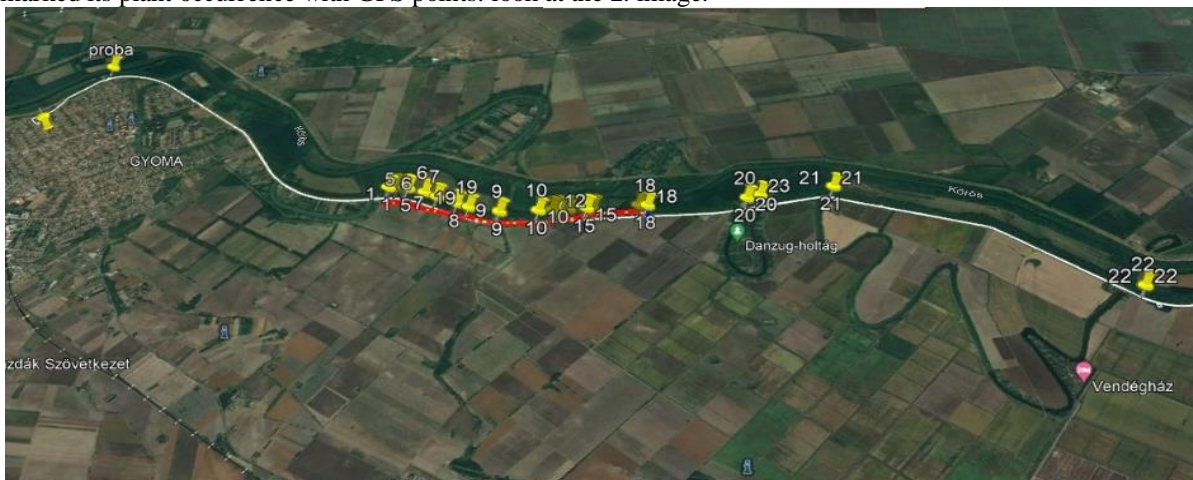


Figure 2.: GPS points confirming the presence of the plant on the investigated dam section.

We identified large groups of individuals at the newly verified points. The identification of the group itself is also a new result, as it was not previously identified in this location.

During the next field investigation, we carried out tests on the number of individuals (abundance) and dominance of the groups of identified points. The phenological state of the plant was then in the stage of full flowering and the beginning of seed formation. The number of individuals was determined (by counting) in 18 sample areas in three repetitions, which was averaged for the given sample area. We also adjusted the dominance definition to these repetitions. The above-mentioned 1-3 grade scale was used to determine dominance.

During the investigation, it can be established that the plant is not evenly distributed in the area. The results of the individual count are 113-514 plants per square meter. We adapted the definition of dominance to this stem number results. Thus, dominance level 1 means 50-150 plants per square meter. The level 2 means 150-250 plants per square meter. The level 3 means more than 250 plants per square meter.

The results of the dominance at the previously identified site can be classified into level 2 (medium) and level 1 (small number of individuals). The new deposit can be found between the Torzsás backwater and the Danzug backwater. Its length is 3.8 km. It can also be said about the new place of occurrence that the plant occurs with a spotted, mosaic sign. The presence of the plant is replaced by sections of absence 50-150 meters in extent. In the dominance of the new place of occurrence, level 3 can also be observed with numbers of 378-514 individuals. Table 1 shows the number of individuals in one square meter and the degree of dominance. The incidence of 2nd and 1st level of dominance is the same. From an ecological point of view, the further spread of these groups is more likely in the future. We currently do not provide an explanation for the areas separating the occurrence groups, where the plant cannot be observed at all (absence area). At the time of the investigation, we registered a bare soil surface here. We plan to carry out a soil test, in the future to explain the areas of deficiency. Since the dam is an artificial human creation, the soil that gets here is of different quality.

*Table 1.*

The dominance and number of individuals of the large mushroom grass in the sample areas of the investigated area in 2024

GPS point identifier	3. level of dominance	2. level of dominance	1. level of dominance	Absence area
004		156		
005			113	
006			122	
007			114	
008			121	
009		165		
010				*
011				*
012		169		
013				*
014	393			
015		182		
016				*
017		159		
018				*
019			121	



\*\*\*[https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347\(99\)01799-1](https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347(99)01799-1)

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