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Photo Story

Photo diary of the Expeditions to the old cemeteries of southern Ukraine (2023-2024)

Photos and text by Nadiia Skobel [1,2*], Nataliia Velychko [1], Emilia Heinzel [3] & Ivan Moysiyenko [1]

[1] Department of Botany, Kherson State University, Kherson, Ukraine
[2] Department of Ecology and Environmental Conservation, Institute of Environmental Biology, University of Warsaw, Warsaw, Poland
[3] University of Göttingen, Göttingen, Germany

* Corresponding author: skobel2015@gmail.com

We organized expeditions to the old cemeteries located within the Right-Bank of the Dnipro Grass Steppe District in the Northern Black Sea Region in 2023-2024. The study of old cemeteries frequently could concentrate on historical heritage, whereas the study of biodiversity is a new phenomenon in our country. Local residents have traditionally been perplexed by our interest in studying old cemeteries, as they are unaware of the historical, artistic, or biodiversity conservation significance of these sites. It is not uncommon for people to be surprised by the number of plant species that can be found in cemeteries. When we posed the hypothetical question of the number of species that might be found in a cemetery, the response was that between 50 and 60 species could be expected. Upon sharing the actual number of plant species present, they were astonished. For example, the species richness of the old cemetery in the village of Skobelovo is 171, including 11 protected species. In any case, we have never encountered any negative attitudes towards us. This may be taken to indicate that these sites are respected when we explain that we study old cemeteries as refugia for steppe flora in Ukraine.

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Further Reading:

Didukh, Y.P. 2003. Heobotanichne rayonuvannya Ukrayiny ta sumizhnykh terytoriy [Geobotanical zoning of Ukraine and adjacent territories]. *Ukrainian Botanical Journal* 60(1): 6–17. [in Ukrainian]

Rudenko L.H. et al. (Eds.). 2007. Geobotanical zoning. In: *National Atlas of Ukraine*, pp. 196-197. State Scientific and Production Enterprise “Kartographia”, Kyiv, UA.

Our cultural heritage sites team.

Spring 2023 (24th April - 2nd May 2023)

Our team has remained the same throughout all the expeditions - Nadiia Skobel, Ivan Moysiyenko, Nataliia Velychko and Olena Shchepeleva. All representatives of KSU have become a well-coordinated team studying cultural heritage sites (about other expeditions, such as mounds and ramparts, in the next photo stories, the research is not yet completed and is ongoing).

All the participants live in different cities (Warsaw, Kyiv, Odesa). Therefore, our starting meeting point was Kyiv. Our journey started in Kyiv with the next meeting point in Mykolaiv.

This was our first big organised expedition to study the flora of old cemeteries. Due to ethical considerations and a need to circumvent potential obstacles, the expedition was postponed by a week following a period of remembrance observed on Remembrance Sunday (in Ukrainian "*pomynalna nedilia*"). This is the first Sunday after Easter and also known in folk tradition as "Red Hill." On this day, adherents honour their deceased relatives.

The week following Remembrance Sunday is designated as Remembrance Week, during which many individuals visit cemeteries to perform various activities, including cleaning graves, placing food, candies, and flowers, and commemorating their deceased relatives. In Ukrainian cemeteries, there are often small tables where people can sit and reflect on their relatives (our workspace for herbarium and chamber processing). Nevertheless, even in the subsequent week, we encountered local residents who proffered refreshments (it is customary to accept such offerings) and inquired about our research activities in the old cemetery.

We lived in rented apartments, which was the case in subsequent expeditions, hotels, and once we stayed with the head of the Department of Botany at Odesa University - Dr. Prof. Tkachenko Fedir Petrovich, who hospitably welcomed us to his "*dacha*" (summer house).

First spring expedition.

The first expedition was a reconnaissance aimed at inventorying the spring flora and selecting old cemeteries for research and trait collection. The Vegapp application was employed for field research in floristic and geobotanical releves. This technology was recommended by Ivan Moysiyenko, who learned about it after attending the 62nd Symposium of the IAVS - Bremen, Germany. Software demonstration of Vegapp by Sebastian Schmidtlein. One of the significant advantages for our team was the data export feature to Tuboveg 2,so was digitized of a vegetation data for each cemetery after each expedition.

We also planned to study the functional traits of steppe species at the old cemeteries (SLA, generative height, vegetative height). This was the period for collecting materials, and we planned to process them in the winter by weighing the dried leaves. Every time in the field was filled with jokes, processing herbarium materials, and drying samples for traits in the hotel. The first expedition was inspiring with a substantial amount of work. The last days of the expedition brought us rain, but plants do not hide from botanists, so we continued working in raincoats, and later in the evenings and nights, work with samples for traits.

Work with functional traits.

During the work with traits (and continuous in the evening).

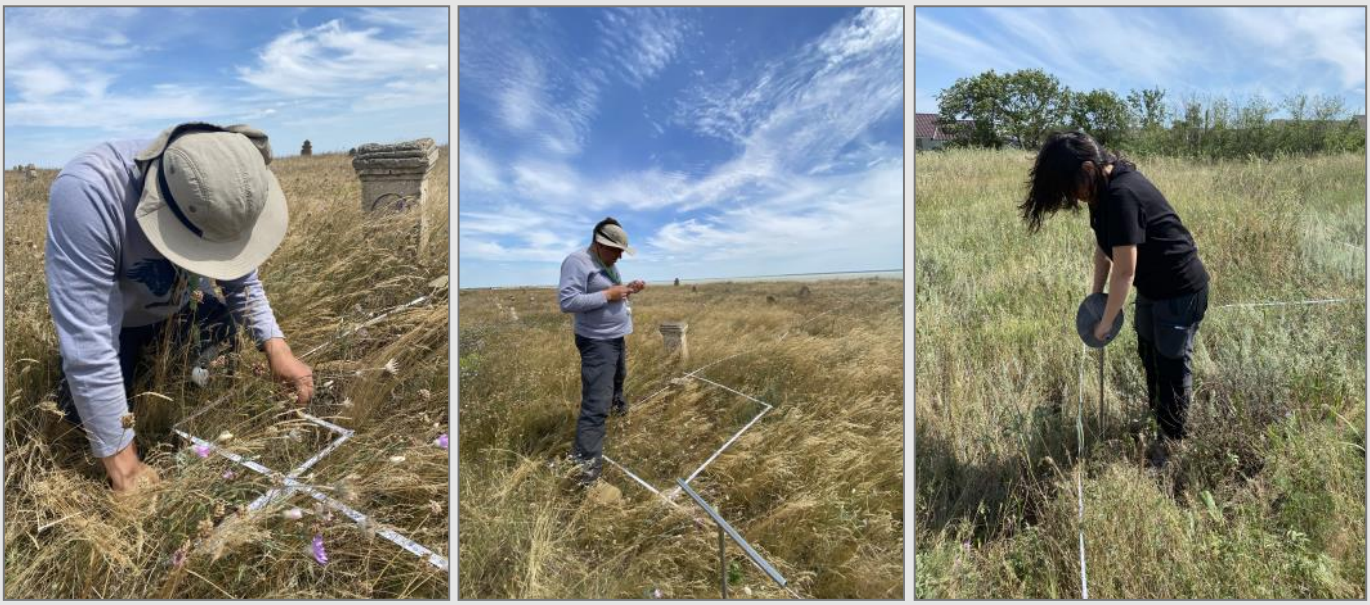
Summer 2023 (3th -10th July 2023)

The second expedition also included biodiversity plots. During this field season we took 10 biodiversity plots and investigated 39 old cemeteries. It was the longest and our hottest expedition (was time with 37°C). This time, our plan was to study the flora in detail and to do biodiversity plots. A lot of sampled material gradually accumulated and always took up a lot of space. Every move during each expedition has always been a game of Tetris of packing materials and suitcases.

Sampling of biodiversity rafts always caused bewilderment among the local population, but people were interested in why we were doing it, about their relatives buried and how they planted something from the steppe or the surrounding area on the grave of their relatives (*Adonis, Paeonia,* etc). Such stories gave us more information and that it is also relevant for the population, we never met any negative attitude from people. This expedition was an inspiration for us, we worked in the middle of the vegetation season.

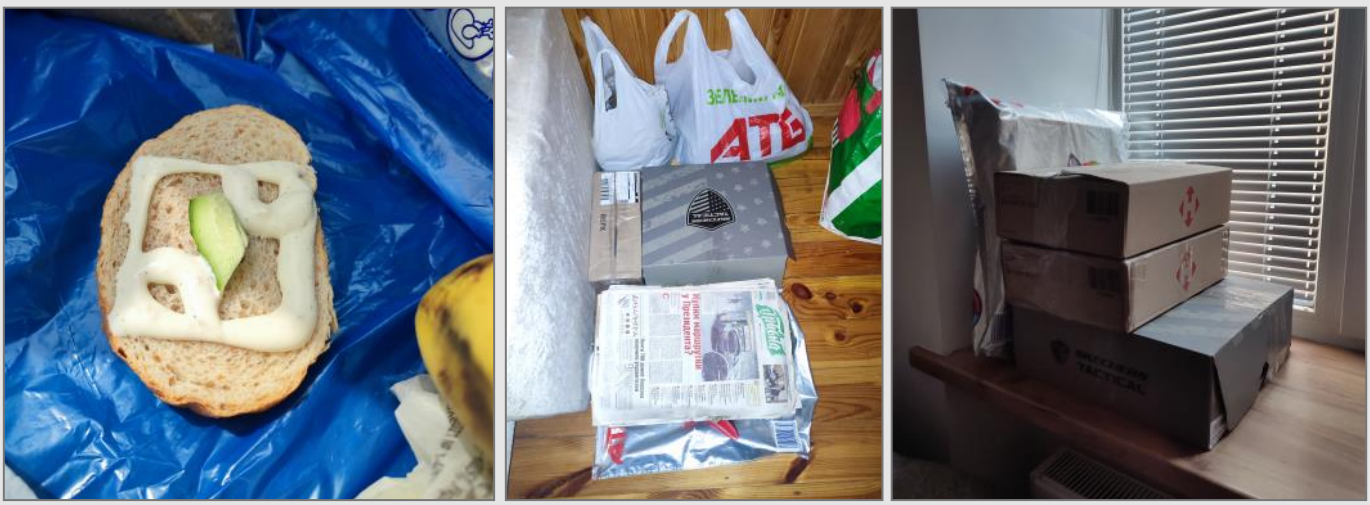
Work with plant identification and penetrometer.

Work with plant identification and biodiversity plots.



Work moments.

View in Hlyboke.



“Draft” of plot and materials.

We did not classify the cemeteries by cultural status and did not plan to specifically study the flora and differences in care among different ethnic groups, as our main goal was to highlight these sites as centers for the preservation of steppe flora. However, our research includes old Jewish cemeteries in the cities of Bilhorod-Dnistrovskyi and Kherson (characterized by burials without flowers or cultivated plants, though according to our observations, these sites are also synanthropized), a Cossack cemetery (Shestirnia), cemeteries with kurgans (Kamianka, Kosivka, Lymany, Vypasne, Usatove), a cemetery on a kurgan (Prylymanske), a lot of burials with old stone crosses, and even one German cemetery (Pshonianove - in German "Neu Peterburg," established by German colonists in Odesa Region). A cemetery that is being washed away and collapses into the estuary, with human bones and old coffin boards sticking out of the clay steep bank. Ancient Cossack crosses falling down.

Protected species in the culture (*Paeonia tenuifolia*).

The oldest cemetery (Odradovo) and the German colonists' cemetery.

Hlyboke with erosion.

The steppe is particularly aesthetically pleasing during the *Stipa* flowering season in the summer months. The steppe at old cemeteries is no exception, combining the tranquillity of nature with the profound history of our ancestors.

It is a common occurrence to observe graves of an ancient stone construction, situated in a steppe environment, which are home to species, such as *Agropyron, Festuca, Salvia, Stipa*, etc.

The oldest cemetery (Odradovo) and the German colonists' cemetery.

It is remarkable to observe how the lack of maintenance of graves has permitted the survival and spread of these species in old cemeteries. It has been observed that not traditional practices in the management of cemeteries have involved the neglect of graves, which have been allowed to remain unmaintained for extended periods, often spanning several years, decades, or even longer. It is notable that these old graves often serve as habitats for rare and steppe species. In contrast, new graves are often weeded and, over time, become overgrown with invasive species and shrubs that are not native to the steppes. This is primarily due to the specific traditions of grave care in Ukraine, which are not typical for Europe, where burial sites are usually represented by tombstones with minimal interference in the vegetation cover.

Old graves and preservation of steppe species (*Stipa capillata*).

It is a matter of great sadness to observe the graves of fallen soldiers adorned with the Ukrainian flag, a distinctive emblem of military graves. At each cemetery, we were inevitably confronted with the poignant presence of fallen warriors after Russian invasion in 2022.

Ukrainians military graves.

Autumn 2023 (20th -26th October 2023)

We investigated flora of 39 old cemeteries. In our investigation of old materials, SLA samples were located in Lviv (Institute of Ecology of the Carpathians). Unfortunately, all the samples were damaged by insects in the herbarium. Our team was very disappointed by this. However, we completed the expeditionary research for most of the cemeteries (33), with the flora studies of the remaining 7 cemeteries and subsequent 10 biodiversity plots still ahead.

During this expedition, we were also invoved in additional research of fungal diversity of Ukraine. We attempted to take fungal samples at some old cemeteries where biodiversity plots were established (Kostiantynivka, Popazdra), but these samples were only sent and not yet processed. We are uncertain about the outcomes, but if we discover something new, we will write a brief report in *Palaeartic Grasslands*.

Autumn expedition.

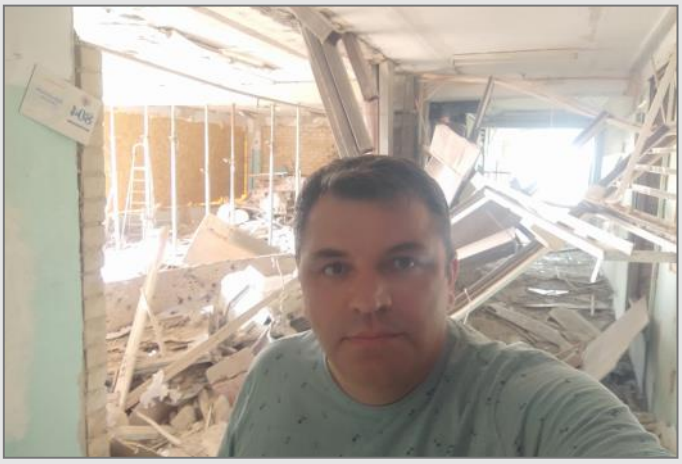
Spring 2024, Part 1 (10th -12th April 2024)

This period we completed our research on the flora of old cemeteries. This time it was a short expedition aimed at studying the flora of 7 old cemeteries. Although we combined these expeditions with the study of the flora of other cultural heritage sites: earthworks and kurhans of the forest zone Polissiia etc. (more about this in the next photo stories, the project is still ongoing).

Spring 2024, Part 2 (23rd -26th May 2024)

This time, we were joined by and internship student from Germany Emilia Heinzel (University of Göttingen - Georg-August-Universität Göttingen). As a lot of floristic research had already been completed on previous expeditions, our efforts were concentrated on just 10 biodiversity plots. One of the main highlights was the work on the cemetery in Kherson city. Located less than 10 km away from Russian positions and less than 3 km away from the beginning of grey zone, it was the first biodiversity plot we established in a war zone. Our unusual presence even made it into the local media outlets. There was a report about "strange people" on the cemetery: "They walk around, write something down, rummage, and delve into the grass. A passerby suggests, "They must have lost something valuable - maybe a chain?" "This isn't a beach," he adds from the other side. "Well, isn't that something?" It turns out... this happens too? They're botanists studying the flora at the old cemetery. They say cemeteries are like small reserves. Wild grass here isn't mowed or trimmed. That's why not only common, not only black species can be found and also the red species (meaning species from Red Data Book)".

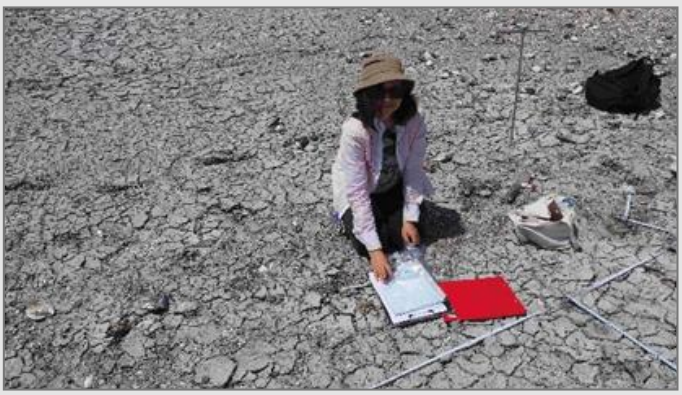
Additionally, the opportunity was taken to meet with the caretaker of the Usatove cemetery, which is situated in an area of historical interest. Upon observing our presence at the cemetery, local residents noted the presence of individuals engaged in a peculiar and unusual activity on the mound (biodiversity plot). The caretaker informed us that the kurgan is mowed annually before Remembrance Sunday. According to the caretaker, this practice enhances the aesthetic appeal of the cemetery. While this type of management has also been observed at other cemeteries, it is unclear if it is related to Remembrance Sunday.



A visit during the expedition to Kherson State University, which was damaged by Russian missiles.

During our research, we heard hundreds of air raid alarms - we never forgot that there was a war in Ukraine.

Some of our sites were mined.



After the Kakhovka tragedy, we always visited the former Kakhovka reservoir to monitor the vegetation (usually before the expedition to the old cemeteries, photos 2023/2024).

One of the plot was made in the 0-zone. The last biodiversity 20th plot (first one in Kherson).

Last lunch after completion of fieldwork in May 2024.

Balovne.

Borysivka.

Buldynka.

Chervonyi Tik.

Fedorivka.

Hlyboke.

Inhulka.

Jewish cemetery c. Bilhorod-Dnistrovskyi.

Kamianka.

Khrystoforivka.

Korolivske.

Kosivka.

Kostiantynivka.

Kozatske and expansion of *Ailanthus altissima*.

Liubopil.

Lyman.

Kryzhanivka.

Mykolaivskyi Nekropo.

Nerubaiske.

Nova Dofynivka.

Novobohdanivka (big cemetery).

Novobohdanivka (small cemetery).

Odradove.

Popazdra.

Prylymanske.

Pshonianove.

Sebyne.

Shyroke.

Shestirnia.

Skobeleve.

Sychavka.

Trapivka.

Starokozachie.

Usatove.

Ust-Kamianka.

Velyka Korenykha.

Velykyi Dalnyk.

Vypasne.

Yelysavetivka.

Some protected species of old cemeteries

Adonis volgensis.

Anemonoides sylvestris.

Astragalus dasyanthus.

Cymbochasma borysthenica.

Ephedra distachya.