

An annotated list of the flora of the perspective local botanical reserve “Vovchi Vody” (Kharkiv region, Ukraine)

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The territory of the projected local botanical reserve “Vovchi Vody” is situated in the eastern vicinity of Vovchansk town (Chuhuiv (formerly Vovchansk dist.) district, Kharkiv region, Ukraine) and occupies 47 ha. The area of the perspective nature reserve includes chalk outcrops, steppe plots, floodplain meadows on the right bank of Vovcha river, spontaneous dumps, roads and trails, ruined buildings of brick factory. There are few finds of rare species, but have not detail floristic researches. The brick factory was working there from the end of XIX to the end of XX centuries. The landscapes are transformed and destroyed after it activity. During 2018–2020, we has thirteen expeditions. We created an annotated list of the vascular plant of the studied territory. The list includes the information about modern scientific name of the species; their relative occurrence; distribution pattern, hyhromorphes and ceonorphes; selection division to alien and rare flora fractions etc. The floristic list of the perspective botanical reserve “Vovchi Vody” includes 206 species from 47 families, 3 classes and 2 divisions of vascular plants. The largest families are Asteraceae (35 species; 16,9 %), Poaceae (20 species; 9,7 %), Fabaceae (20 species; 9,7 %), Lamiaceae (19 species; 9,2 %), Scrophulariaceae (13 species; 6,3 %), Rosaceae (9 species; 4,3 %) Ranunculaceae (7 species; 3,4 %), Apiaceae, Boraginaceae, Rubiaceae (each one contains 6 species; 2,9 %). The area of perspective nature reserve has great scientific and bioconservation importance. Twenty five species have a sozological value. Ten species are included to Red Data Book of Ukraine and fifteen species are included to Official list of regional rare plant species of Kharkiv region.

Key words: an annotated list of the flora, the chalk flora, bioconservation, sozology, rare plant species, The Nature Reserve Fund

БОНДАРЕНКО Г.М., ГАМУЛЯ Ю.Г. (2021). Анотований список флори перспективного ботанічного заказнику місцевого значення «Вовчі Води» (Харківська область, Україна). *Чорноморськ. бот. ж.*, **17** (3): 242–252. doi: 10.32999/ksu1990-553X/2021-17-3-4

Проектований ботанічний заказник місцевого значення «Вовчі Води» знаходиться у східних околицях міста Вовчанськ (Чугуївський (колишній Вовчанський) район, Харківська область, Україна) і охоплює 47 га. Територія перспективного об'єкту Природно-заповідного фонду включає у себе крейдяні відслонення, степові ділянки, заплавні луки на правому березі річки Вовча, стихійні звалища, дороги та стежки, зруйновані будівлі колишнього цегляного заводу. Це місце відомо кількома знахідками рідкісних видів, але детальних флористичних досліджень раніше не проводились. Цегляний завод працював там з кінця XIX до кінця XX століть. Це стало причиною трансформованих та зруйнованих ландшафтів і відсутності флористичних досліджень цієї ділянки. Протягом 2018-2020 років було здійснено 13 експедиційних виїздів. За результатами досліджень складено анотований список



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судинних рослин досліджуваної території. Список включає інформацію про сучасну наукову назву виду, його відносну зустрічаємість, характер розповсюдження на досліджуваній території, гігро- та ценоморфу, приналежність видів до адвентивної або раритетної фракції флори тощо. Список містить 206 видів, які відносяться до 47 родин, 3 класів і 2 відділів судинних рослин. Найбільші за видовим різноманіттям родини – це Asteraceae (35 видів; 16,9 %), Poaceae (20 видів; 9,7 %), Fabaceae (20 видів; 9,7 %), Lamiaceae (19 видів; 9,2 %), Scrophulariaceae (13 видів; 6,3 %), Rosaceae (9 видів; 4,3 %) Ranunculaceae (7 видів; 3,4 %), Аріасеае, Boraginaceae, Rubiaceae (по 6 видів у кожній; 2,9 %). Досліджувана територія має велике наукове та природоохоронне значення. Тут зростають 25 видів, які мають созологічну цінність. До Червоної книги України занесено 10 видів, 15 видів – включені до Офіційного списку регіональних рідкісних видів рослин Харківської області.

Ключові слова: анотований список флори, крейдяна флора, збереження біологічного різноманіття, созологія, рідкісні види рослин, Природно-заповідний фонд

БОНДАРЕНКО Г.М., ГАМУЛЯ Ю.Г. (2021). **Аннотированный список флоры перспективного ботанического заказника местного значения «Волчьи Воды» (Харьковская область, Украина).** *Черноморск. бот. ж.*, 17 (3): 242–252. doi: 10.32999/ksu1990-553X/2021-17-3-4

Проектируемый ботанический заказник местного значения «Волчьи Воды» находится в восточных окрестностях города Волчанск (Чугуевский (бывший Волчанский) район, Харьковская область, Украина) и охватывает 47 га. Территория перспективного объекта Природно-заповедного фонда включает в себя меловые обнажения, степные участки, пойменные луга на правом берегу реки Волчья, стихийные свалки, дороги и тропы, разрушенные здания бывшего кирпичного завода. Это место известно несколькими находками редких видов, но детальных флористических исследований ранее не проводилось. Кирпичный завод работал там с конца XIX до конца XX столетия. Это стало причиной трансформированных и разрушенных ландшафтов и отсутствия флористических исследований этого участка. В течение 2018–2020 годов было осуществлено 13 экспедиционных выездов. По результатам исследований составлен аннотированный список сосудистых растений исследуемой территории. Список включает информацию о современной научное название вида, его относительную встречаемость, характер распространения на исследуемой территории, гигро- и ценоморфу, принадлежность видов к адвентивной или раритетной фракции флоры.. Список содержит 206 видов, относящихся к 47 семействам, 3 классам и 2 отделам сосудистых растений. Наибольшие по видовому разнообразию семейства – это Asteraceae (35 видов; 16,9 %), Poaceae (20 видов; 9,7 %), Fabaceae (20 видов; 9,7 %), Lamiaceae (19 видов; 9,2 %) , Scrophulariaceae (13 видов; 6,3 %), Rosaceae (9 видов; 4,3 %) Ranunculaceae (7 видов; 3,4 %), Аріасеае, Boraginaceae, Rubiaceae (по 6 видов в каждой; 2,9 %). Исследуемая территория имеет большое научное и природоохранное значение. Здесь растут 25 видов, которые имеют созологічну цінність. В Красную книгу Украины занесено 10 видов, 15 видов – включены в Официальный перечень регионально редких видов растений Харьковской области.

Ключевые слова: аннотированный список флоры, меловая флора, сохранение биологического разнообразия, созологія, охраняемые виды растений, Природно-заповедный фонд

Biodiversity researches, the searching for new localities of the rare and protected plant species, the expansion of the existing network of the Nature Reserve Fund and the development of the Emerald Network are important tasks for Ukrainian integration to the European Union. A high number of scientists conduct research in this direction, but a lot of territories, which have scientific value, are not researched and protected.

The chalk outcrops of the Central Russian and Donetsk Uplands are characterized by specific edaphic conditions that reflected on the flora features. Most cretophilic plant species have narrow ecological amplitudes and they are endemics of the Don and Volga river basins

[TALIEV, 1905]. According to Red Data Book of Ukraine [RED DATA BOOK, 2009] about 50 cretophilic species need to be protected. The history of a chalk flora research is more than 150 years and a lot of Ukrainian and Russian botanists have revealed the features of flora, vegetation and ecology of carbonate substrates: V.M. Cherniaev [CZERNIAËW, 1859], V.N. Sukachiov [SUKATSCHIEFF, 1902], D.I. Litvinov [LITVINOV, 1902], V. I. Taliev [TALIEV, 1905], E.M. Lavrenko [LAVRENKO, 1930], B.M. Kozo-Polianskiy [KOZO-POLJANSKYI, 1931], M.I. Kotov [KOTOV, 1939], M.V. Klovov [KLOKOV, 1947]. The current stage of the Kharkiv region chalk outcrops flora research started at the end of XXth century. Scientists of the Kharkiv National University were continuing the research of the regional flora and phytodiversity of the chalk slopes, however the available publications are dedicated only to rare fraction of the flora and to the justification for the inclusion of certain areas to the objects of the Nature Reserve Fund of Ukraine [GORELOVA et al., 1993; GORELOVA; GORELOVA, 2003; FILATOVA, 2012; BEZRODNOVA, 2014; GAMULYA et al, 2017]. The geographical fragmentation of research and the lack of complete floristic lists of similar territories do not allow assessing the chalk outcrops biodiversity state in the East of Ukraine and prediction its further changes under increasing anthropic load. Besides chalk outcrops are associated with river valley and occupy high right banks. They are border on steppes, floodplains and forests. Most steppes habitats and steppes species are reserved in ravines and right banks of the rivers. Steppes habitats have become rare, because they are transformed as fields for the agriculture [PARNIKOZA, 2008]. Thus, that habitats need protection and chalk outcrops associated with them are important objects for preserving of steppes habitats [ZOLOTUKHIN et al., 1997].

The composition of the chalk outcrops flora in the vicinity of Vovchansk town has not been studied before. This territory has been used since the first half of the XIXth century until the end of XXth century as chalk quarry. After the closure of the factory, this area has not been explored for more than 20 years. In 2018, we began researching this area [BONDARENKO, SIRA, 2018; BONDARENKO et al., 2019]. According to the received data it is established that during this time processes of natural restoration of flora took place. The main purpose of this research is studying the current flora composition of the perspective reserve “Vovchi Vody”.

The territory of the research

The territory of reserve is situated in Chuhuiv district (formerly Vovchansk district) of the Kharkiv region in the eastern vicinity of Vovchansk town (50°18'27.3"N 36°58'52.7"E). According to Geobotanical Zoning of Ukraine the researched area belongs to Siverskii Donets district of herbaceous-cereals steppes, concavity oak forests and the vegetation of the chalk outcrops (tomilars) of the Pontic steppe province [DIDUKH, SHELYAG-SOSONKO, 2003].

The territory of the perspective reserve “Vovchi Vody” is situated on the right bank of Vovcha river (the left inflow of Siverskii Donets river) in its lower current. The total area is 47 hectares (Fig.). There are chalk slopes, herbaceous-cereals steppe and meadow-steppe plots, floodplain and oxbow represented on the researched area. Additionally, the ruins of factory buildings, dirt roads and natural dumps have been reserved in that territory. The area of the perspective reserve has a variegated geo-morphological structure. The appearance of the slopes varies considerably. Macrorelief is represented by slopes with different incline, erosion and overgrowth level, soils and exposition. The substrate of the slopes is represented mainly by a mobile fraction of chalk in the form of crumbs with a diameter of 5-45 mm and sometimes mixed with marl. Steppe slopes are formed on plane top of the slopes on the degraded chernozems soil. The meadow-steppes are situated on the northern part of the researched territory, on the slopes furthest from the river.

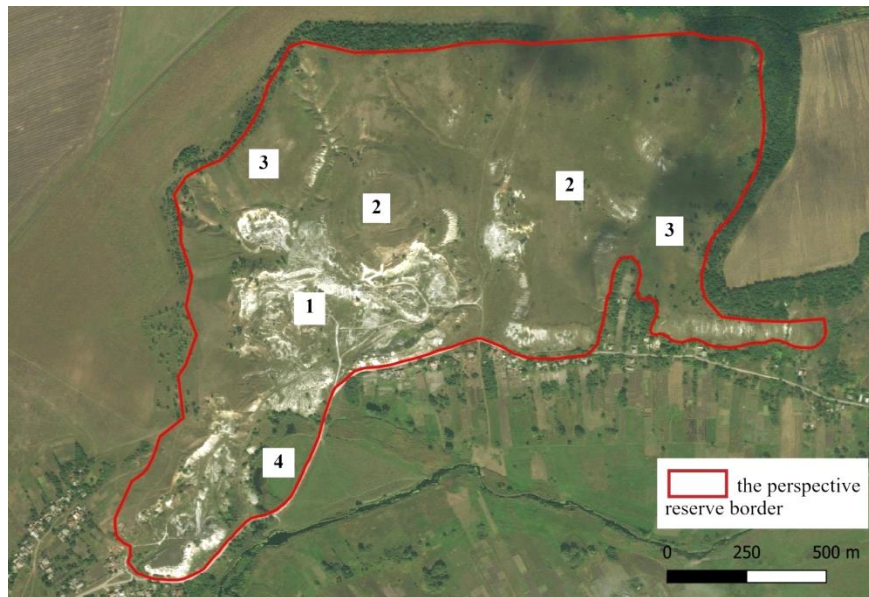


Fig. 1. The map of the territory of the perspective local botanical reserve «Vovchi Vody» in Chuhuiv (Vovchansk) district, Kharkiv region, Ukraine (1 – chalk outcrops, 2 – steppe plots, 3 – meadow-steppes slopes, floodplain meadow and lake (50°18'27.3"N 36°58'52.7"E)

Materials and methods

The flora research and inventory of the reserve were conducted in 2018–2020. A total of 13 expeditions were made during different periods of the vegetation season. We used roye method for flora explorations. The total route was approximately 11.8 km. At the same time, we provided photo- and geo-fixation of the rare plant species localities and collected more than 400 herbarium specimens for further identification. The herbarium material was placed in Herbarium of V. N. Karazin Kharkiv National University (CWU).

We have made an annotated list of vascular plants growing in the territory of the perspective local botanical reserve “Vovchi Vody”. The species names are given on the base of Checklist folded by S.L. Mosyakin and M.M. Fedorchuk [MOSYAKIN, FEDORCHUK, 1999]. The list includes the data about the character of distribution on the researched territory (localized (one locality), sporadically (a few localities), wide distributed (difficult to determine the separate localities) and number in the phytocoenoses composition (based on the Drude’s scale [DRUDE, 1884] (Sol. – plants are rare and singularly; Sp. – plants are rare and sporadically; Cop. 1 – abundantly; Cop. 2 – abundantly, there are many individuals; Cop. 3 – very abundantly). Also the list has information about hydromorphes (xerophytes, sub-xerophytes, sub-mesophytes, mesophytes, hyhromesophytes, hyhrophytes, per-hyrophytes) and coenomorphes (Ru – ruderals or weeds, Pr – pratants or meadows plants, St – steppants or steppes plants, Sil – sylvantes or forest plants, Ps – psammophytes or sand plants, Ptr – petrophytes or rocky outcrops plants, Ca – calcephytes or plants of the carbonate substrates, Hal – halophytes or plants of the salt habitats, Pal – palutants or swamp plants) of each species. Besides the list includes different notes about protection status (RDBU – the species included to The Red Data Book of Ukraine [2009], RRKh – species included to The Official List of Regionally Rare Plant Species of Kharkiv Region [2012], scientific significance (endemic, relict, steppes species) and belonging to the adventitious fraction (Adv. – alien species; Erg. – ergasiophytes; Xen. – xenophytes).

The results

An annotated list of the projected botanical reserve “Vovchi Vody” flora
ACER negundo L. – Cop.1; sporadically; mesophyte; (Ru)Sil; Adv. (Erg.).
ACHILLEA nobilis L. – Cop.2; sporadically; sub-mesophyte; PrSt.

- A. ochroleuca** Ehrh. – localized (on the steppe plot), Sol.; sub-mesophyte; St.
A. stepposa Klokov & Krytzka – Sp., sporadically; St.
A. submillefolium L. – Cop.2, wide distributed; mesophyte; RuPr.
AGRIMONIA eupatoria L. – Sp., sporadically; mesophyte; SilSt.
AGROSTIS stolonifera L. – Cop.1, localized (close to floodplain lake); hyhrophyte; PrPal.
AJUGA chia Schreb. – Cop.1, sporadically; sub-xerophyte; St.
A. genevensis L. – Sp., sporadically; sub-mesophyte; (Ru)SilPr.
ALISMA plantago-aquatica L. – Sp., localized; sub-hyrophyte; PrPal; it was observed until 2020
ALLIUM flavescens Bess. – Sol., localized; RRKh; sub-xerophyte; PtrSt.
A. oleraceum L. – Sp., sporadically; sub-mesophyte; SilSt.
A. rotundum L. – Cop.2, wide distributed; sub-mesophyte; St.
A. sphaerocephalon L. – Cop.1, sporadically; sub-mesophyte; PrSt.
ALYSSUM minutum Schlecht. ex DC. – Sp., sporadically; sub-xerophyte; Ps.
AMBROSIA artemisiifolia L. – Cop.1, sporadically (along the trails), Adv. (Erg.); sub-mesophyte; Ru.
ANDROSACE kozo-poljanskii Ovcz. – Cop.2, sporadically, RDBU (endangered, endemic, relict); xerophyte; Ptr(Ca).
ANEMONE sylvestris L. – Cop.1, localized, RRKh; sub-mesophyte; StSil.
ANTHEMIS tinctoria L. – Cop.3, wide distributed; sub-mesophyte; PsSt.
ANTHYLLIS vulneraria L. (*A. schiwerekii* (DC.) Blocki) – Cop.2, sporadically, RRKh; mesophyte; StPr.
ARISTOLOCHIA clematitis L. – Cop.1, localized (in the relief depression); mesophyte; RuSil.
ARMENIACA vulgaris Lam. (*PRUNUS armeniaca* L.) – Cop.1, sporadically, Adv. (Epr); Sil.
ARTEMISIA absinthium L. – Cop.2, wide distributed (along the trails and roads, on the transformed places and dups), Adv. (Xen); mesophyte; Ru.
A. austriaca Jacq. – Cop.1, sporadically (on the sand soils); sub-xerophyte; RuSt.
A. hololeuca M.Bieb. ex Besser – Sol., localized, RDBU (unvalued, endemic); sub-mesophyte; Ptr(Ca).
A. marschalliana Spreng. – Sp., sporadically; sub-mesophyte; (Pr)StPs.
A. vulgaris L. – Cop.1, sporadically (along the roads and trails); mesophyte; (Pr)StPs.
ASPARAGUS officinalis Steven ex Ledeb. – Cop.1, sporadically; sub-mesophyte; PrSt.
ASPERUGO procumbens L. – Sp., sporadically (close to dirt road); sub-mesophyte; Ru.
ASPERULA cynanchica L. – Cop.1, localized (on the steppe slope); sub-mesophyte; StPs.
A. tephrocarpa Czern. ex M. Pop et Chrshan. – Cop.3, wide distributed, RRKh; sub-mesophyte; Ptr(Ca).
ASTRAGALUS onobrychis L. – Cop.2, wide distributed; sub-xerophyte; StPs.
A. varius S.G. Gmel. – Cop.1, sporadically; sub-xerophyte; StPs.
ASYNEUMA canescens (Waldst. et Kit.) Griseb. & Schenk – Sp., sporadically; sub-mesophyte; StPtr.
BETULA pendula Roth – Sol., sporadically; hyhro-mesophyte; Sil.
BROMOPSIS erecta (Huds.) Fourr. – Cop.1, sporadically; sub-mesophyte; StRu.
B. inermis (Leyss.) Holub – Cop.1, sporadically; sub-mesophyte; PrSt.
BROMUS hordeaceus L. (*B. mollis* L.) – Cop.2, sporadically; PrSt.
BUPLEURUM falcatum L. – Cop.3, wide distributed; sub-mesophyte; PtrSt.
BUTOMUS umbellatus L. – Cop.1, localized (on the floodplain lake bank); per-hyrophyte; PalAq; it was observed until 2020
CALAMAGROSTIS epigeios (L.) Roth – Cop.2, sporadically; mesophyte; (Sil)PrPs.
CALYSTEZIA sepium (L.) R. Br.; Sp., localized (on the floodplain); hyhro-mesophyte; PrPal; it was observed until 2020
CAMPANULA glomerata L. – Sp., sporadically; mesophyte; PrSil.

- C. rapunculoides** L. – Sol., localized; mesophyte; PrSil.
C. sibirica L. – Cop.2, wide distributed; sub-mesophyte; RuSt.
CARAGANA frutex (L.) K. Koch – Cop.3, sporadically; sub-mesophyte; (Sil)St.
CARDARIA draba (L.) Desv. – Cop.2, sporadically, Adv. (Xen); sub-xerophyte; Ru.
CARDUUS acanthoides L. – Cop.1, sporadically, Adv. (Xen); sub-mesophyte; StRu.
CAREX humilis Leys. – Sp., localized, RRKh; sub-xerophyte; StPtr.
C. praecox Schreb. – Cop.1, sporadically; sub-mesophyte; StPr.
CARLINA bieberschteinii Bernh. ex Hornem – Cop.1, sporadically; sub-mesophyte; (Ru)PtrSt.
CENTAUREA biebersteinii DC. (*C. micranthos* L.) – Cop.1, wide distributed; sub-mesophyte; St.
C. jacea L. – Sp., sporadically; hygro-mesophyte; Pr.
C. orientalis L. – Cop.3, wide distributed; sub-mesophyte; RuSt.
C. sumensis Kalen. – Cop.2, wide distributed, RRKh; Ptr(Ca).
CEPHALARIA uralensis (Murray) Roem. & Schult. – Sol., sporadically; sub-xerophyte; Ptr.
CHAMAECYTISUS austriacus (L.) Link – Cop.1, sporadically; sub-mesophyte; (Sil)PsSt.
CHELIDONIUM majus L. – Sp., localized (close to afforestation); mesophyte; SilRu.
CIRSIUM arvense (L.) Scop. – Cop.2, sporadically; mesophyte; Ru.
CONSOLIDA regalis S.F. Gray – Cop.1, sporadically, Adv. (Xen.); sub-mesophyte; Ru.
CONVOLVULUS arvensis L. – Cop.2, wide distributed; mesophyte; Ru.
COTINUS coggygria Scop. – Sol., sporadically, Adv. (Erg.); sub-mesophyte; Sil.
CRYPISIS alopecuroides (Piller et Mitterp.) Schrad – Cop.1, sporadically; mesophyte; HalPs.
CYNOGLOSSUM officinale L. – Un., localized (near the road), Adv. (Xen); sub-mesophyte; (Sil)PrRu.
DACTYLIS glomerata L. – Sp., sporadically; mesophyte; SilPr.
DAUCUS carota L. – Cop.3, wide distributed; mesophyte; (St.)PrRu.
DIANTHUS campestris M. Bieb. – Sol., localized (on the sand substrate); sub-mesophyte; (Ru)StPs.
ECHINOPS sphaerocephalus L. – Sp., localized; sub-mesophyte; SilSt.
ECHIUM vulgare L. – Cop.2, wide distributed; sub-mesophyte; StRu.
ELAEAGNUS angustifolia L. – Un., localized, Adv. (Erg.); sub-mesophyte; (Ru)Sil.
ELYTRIGIA intermedia (Host) Nevski – Cop.2; wide distributed; sub-xerophyte; (Ptr)St.
E. repens (L.) Desv. ex Nevski – Cop.3, wide distributed; mesophyte; RuPr.
E. stipifolia (Czern. ex Nevski) Nevski – Cop.1, localized, RDBU (unvalued, endemic); sub-mesophyte; PtrSt.
E. trichofora (Link) Nevski – Cop.1, sporadically; sub-xerophyte; St.
EPILOBIUM hirsutum L. – Sp., localized; hygrophyte; PrPal.
ERIGERON acris L. – Sp., sporadically; sub-mesophyte; Ru.
EROPHILA verna (L.) Besser (*DRABA verna* L.) – Cop.1, sporadically; sub-mesophyte; StPs.
ERUCASTRUM cretaceum Kotov – Cop.2, wide distributed, RRKh; sub-xerophyte; StPtr.
ERYNGIUM campestre L. – Cop.2, sporadically; sub-mesophyte; RuSt.
EUPATORIUM cannabinum L. – Cop.1, localized (near the floodplain lake); hygrophyte; SilPal.
EUPHORBIA seguierana Neck. – Cop.3, wide distributed; sub-mesophyte; (Ru)St.
E. virgata Waldst. & Kit. (*E. virgultosa* Klok.) – Cop.3, wide distributed; mesophyte; RuPr.
EUPHRASIA pectinata Ten. – Cop.2, sporadically; sub-mesophyte; SilSt.
FALCARIA vulgaris Bernh. – Cop.1, sporadically; sub-mesophyte; RuSt.
FESTUCA cretacea T.Pop. et Proskor. – Sp., sporadically, RDBU (unvalued, endemic); sub-xerophyte; StPtr.
F. valesiaca Gaud. – Cop.2, sporadically; sub-xerophyte; St.
FILIPENDULA vulgaris Moench – Cop.1, sporadically; sub-mesophyte; StPr.

- FRAGARIA viridis** (Duchesne) Weston – Cop.1, sporadically; sub-mesophyte; SilPr.
FUMARIA schleicheri Soy.- Willem. – Sp., sporadically (along the trails), Adv. (Xen); mesophyte; Ru.
GAGEA minima (L.) Ker Gawl. – Sol., sporadically; sub-mesophyte; PtrSil.
G. pusilla (F.W. Schmidt) Schult. et Schult – Cop.1, sporadically; sub-xerophyte; SilSt.
GALIUM octonarium (Klokov) Soo – Cop.2, sporadically; sub-xerophyte; SilSt.
G. palustre L. – Sol., localized; per-hydrophyte; PalPr.
G. tinctorium (L.) Scop. – Sp., sporadically; sub-mesophyte; StPr.
G. verum L. – Cop.2, wide distributed; sub-mesophyte; PrSt.
GENISTA tinctoria L. – Sp., sporadically; mesophyte; PsSil.
GERANIUM collinum Stephan ex Willd. – Sp., localized (on the floodplane); hydro-mesophyte; HalPr; it was observed until 2020
GEUM rivale L. – Sol., localized (on the floodplane); hydrophyte; SilPr; it was observed until 2020
GLECHOMA hederacea L. – Sp., localized; hydro-mesophyte; RuSil.
GYPSOPHILA oligosperma A. Krasnova – Cop.3, wide distributed; sub-xerophyte; PtrSt.
HELICHRYSUM arenarium (L.) Moench – Cop.2, sporadically; sub-xerophyte; StPs.
HYPERICUM elegans Steph. ex Willd. – Cop.1, sporadically, RRKh; sub-mesophyte; PtrSt.
H. perforatum L. – Cop.2, wide distributed; mesophyte; SilPr.
HYSSOPUS cretaceus Dubjan. – Cop.2, wide distributed, RDBU (unvalued, endemic, relict); sub-mesophyte; Ptr(Ca).
INULA aspera Poir. – Cop.1, sporadically; sub-mesophyte; PrSil.
I. britannica L. – Cop.1, sporadically; hydro-mesophyte; RuPr.
I. helenium L. – Sp., localized (on the floodplane lake bank); hydro-mesophyte; SilPr; RRKh; it was observed until 2020
JURINEA arachnoidea Bunge – Cop.1, sporadically; sub-mesophyte; St.
KOELERIA talievii Lavrenko – Sp., sporadically, RDBU (unvalued, endemic); Xerophyte; StPtr.
LAPPULA squarrosa (Retz.) Dumort – Sol., localized; sub-mesophyte; Ru.
LAVATERA thuringiaca L. – Sp., sporadically; sub-mesophyte; (Ru)StPr.
LEONURUS villosus Desf. ex D'Urv. (*L. quinquelobatus* Gilib.) – Cop.1, sporadically; mesophyte; StRu.
SESELI libanotis (L.) W.D.J.Koch subsp. *intermedium* (Rupr.) P.W.Ball (*LIBANOTIS intermedia* Rupr.) – Cop.2, wide distributed; sub-mesophyte; RuSt.
LINARIA vulgaris Mill. – Cop.2, wide distributed; sub-mesophyte; PrRu.
LINUM flavum L. – Sp., localized (on the meadow-steppe plots), RRKh; sub-mesophyte; St.
L. perenne L. – Cop.2, wide distributed; sub-mesophyte; SilSt.
L. ucranicum (Griseb. ex Planch.) Czern. – Cop.3, wide distributed, RRKh; sub-mesophyte; StPtr.
LONICERA tatarica L. – Cop.2, sporadically, Adv. (Erg.); mesophyte; Sil.
LOTUS ucranicus Klokov – Cop.3, wide distributed; hydro-mesophyte; StPr.
LYSIMACHIA nummularia L. – Sp., localized; hydrophyte; SilPr; it was observed until 2020
L. vulgaris L. – Sp., localized; hydrophyte; Pal; it was observed until 2020
MEDICAGO lupulina L. – Cop.2, sporadically; mesophyte; StPr.
M. romanica Prod. – Cop.2, wide distributed; sub-mesophyte; StPr.
MELAMPYRUM argyrocomum Fisch. ex K.-Pol. – Cop.2, sporadically; sub-mesophyte; SilPr.
MELICA transsilvanica Schur – Cop.3, sporadically; sub-xerophyte; St.
MELILOTUS albus Medik. – Cop.2, sporadically; mesophyte; (Ru)PalPr.
NONEA rossica Steven. – Cop.2, sporadically; sub-mesophyte; Ru.
ODONTITES vulgaris Moench – Cop.1, localized; mesophyte; PrRu.
ONOBRYCHIS arenaria Spreng. – Cop.2, sporadically; sub-mesophyte; StPr.

- ONONIS arvensis** L. – Sp., localized; mesophyte; (Hal)StPr.
ONOPORDUM acanthium L. – Sp., sporadically (near the road and houses); Adv. (Xen); sub-mesophyte; Ru.
ONOSMA tanaitica Klokov – Cop.2, localized, RDBU (unvalued, endemic); sub-xerophyte; StPtr(Ca).
OXYTROPIS pilosa (L.) DC. – Cop.2, sporadically; sub-xerophyte; PtrSt.
PARTHENOCISSUS quinquefolia (L.) Planch. – Un., localized (the one juvenile sample was observed in 2018), Adv. (Erg.); mesophyte; CulRu.
P. inserta (A. Kern.) Fritsch – Cop.1, localized; Adv. (Erg.); CulRu; it was observed until 2020.
PERSICARIA maculosa Gray – Sol., localized (на березі стариці); hygro-mesophyte; (Ru)PrPal; it was observed until 2020.
PHLOMIS tuberosa L. – Sp., localized (in the relief depression); sub-mesophyte; StPr.
PHARGMITES australis (Cav.) Trin. ex Steud. – Cop.2, localized; hygro-mesophyte; PrPal; it was observed until 2020.
PILOSELLA cymosa (L.) F.Schultz & Sch.Bip. – Cop.3, wide distributed; sub-mesophyte; SilPr.
P. echioides (Lumn.) F.Schultz & Sch.Bip. – Sp., sporadically; sub-xerophyte; StSil.
P. officinarum F.Schultz & Sch.Bip. – Cop.2, sporadically; sub-mesophyte; RuPs.
PIMPINELLA titanophyla Woronow – Cop.3, wide distributed; sub-mesophyte; Ptr(Ca).
PINUS sylvestris L. – Cop.1, sporadically; mesophyte; Sil.
PLANTAGO lanceolata L. – Cop.2, wide distributed; mesophyte; StPrRu.
P. media L. – Cop.2, sporadically; mesophyte; PrSt.
P. urvillei Opiz – Cop.1, sporadically; sub-mesophyte; PrSt.
POA bulbosa L. – Sp., sporadically; sub-mesophyte; PsSt.
P. compressa L. – Cop.2, wide distributed; sub-mesophyte; PtrSt.
POLYGALA comosa Schkuhr – Cop.2, sporadically; mesophyte; SilPr.
P. sibirica L. – Sp., sporadically; sub-xerophyte; PtrSt.
POPULUS tremula L. – Sol., localized; hygro-mesophyte; Sil.
POTENTILLA anserina L. – Cop.1, localized (on the floodplain); hygro-mesophyte; Pr.
P. argentea L. – Cop.1, sporadically; sub-mesophyte; (Sil)StPr.
P. patula Waldst. & Kit. – Cop.2, sporadically; sub-mesophyte; StPtr.
P. pilosa Willd. – Cop.2, localized; mesophyte; St.
PULSATILLA pratensis Bernh. – Cop.2, sporadically (2 localities within the studied area), RDBU (unvalued, polymorphic species); sub-mesophyte; SilPr.
RANUNCULUS acris L. – Cop.1, localized; hygro-mesophyte; Pr.
R. illyricus L. – Cop.2, sporadically; sub-mesophyte; PrSt.
R. polyanthemos L. – Cop.2, sporadically; hygro-mesophyte; SilPr.
RESEDA lutea L. – Cop.3, wide distributed, Adv. (Xen); sub-mesophyte; StRu.
RUMEX acetosella L. – Sp., localized; mesophyte; (Sil)PtrPs.
SALVIA aethiopsis L. – Sol., localized (The only one individual was observed in 2020), RRKh; sub-xerophyte; RuSt.
S. nemorosa L. – Cop.2, sporadically; sub-mesophyte; St.
S. nutans L. – Cop.3, wide distributed, RRKh; sub-xerophyte; St.
S. pratensis L. – Cop.1, sporadically, RRKh; sub-mesophyte; SilStPr.
S. stepposa Schost. – Sp., localized; sub-mesophyte; St.
S. verticillata L. – Cop.3, wide distributed; sub-mesophyte; StRu.
SCABIOSA ochroleuca L. – Cop.2, wide distributed; sub-mesophyte; SilSt.
SCUTELLARIA hastifolia L. – Sp., localized (on the bank of the floodplain); hygro-mesophyte; PalPr; відмічався до 2020 р.

- SECURIGERA varia** (L.) Lassen (*Coronilla varia* L.) – Cop.2, wide distributed; sub-mesophyte; (Ru)SilPr.
- SEDUM acre** L. – Cop.1, localized; sub-mesophyte; StPs.
- SENECIO jacobea** L. – Cop.2, sporadically; sub-mesophyte; (St)PrRu.
- SILENE supina** M. Bieb. – Cop.3, wide distributed, RRKh; sub-mesophyte; PsPr.
- STACHYS recta** L. – Cop.3, wide distributed; sub-mesophyte; Ps.
- STIPA capillata** L. – Cop.3, wide distributed, RDBU (unvalued, steppe species); sub-xerophyte; St.
- S. pennata** L. – Cop.2, sporadically, RDBU (vulnerable, typical meadow-steppe species); sub-mesophyte; St.
- SWIDA sanguinea** (L.) Opiz – Sol., localized; hygro-mesophyte; Sil.
- TARAXACUM officinale** (L.) Webb ex F.H.Wigg. – Cop.3, wide distributed; mesophyte; RuPr.
- THALICTRUM minus** L. – Cop.2, wide distributed; sub-mesophyte; SilSt(Ps).
- THESIUM arvense** Horv. – Sp., sporadically; sub-mesophyte; StPr.
- THYMUS calcareus** Klokov & Des.-Shost. – Cop.3, wide distributed, RRKh; sub-mesophyte; Pr(Ca).
- Th. marschallianus** Willd. – Cop.2, sporadically; sub-mesophyte; St.
- TRAGOPOGON major** Jacq. – Cop.1, sporadically; sub-mesophyte; (Ru)SilSt.
- TRIFOLIUM arvense** L. – Cop.1, localized; sub-mesophyte; PsRu.
- T. fragiferum** L. – Sol., localized (on the dirt road near the floodplane lake); hygro-mesophyte; PrHal.
- T. medium** L. – Cop.2, wide distributed; Xerophyte; SilPr.
- T. montanum** L. – Cop.1, sporadically; mesophyte; Pr.
- T. pratense** L. – Cop.1, sporadically; hygro-mesophyte; Pr.
- TUSSILAGO farfara** L. – Cop.2, sporadically; hygro-mesophyte; RuPr.
- TYPHA latifolia** L. – Cop.1, localized; sub-hydrophyte; Pal.
- VERBASCUM lychnytis** L. – Cop.2, sporadically; sub-mesophyte; (Ps)StRu.
- V. nigrum** L. – Cop.2, sporadically; mesophyte; SilPr.
- V. phoeniceum** L. – Sol., localized; sub-xerophyte; RuSt.
- VERONICA anagalis-aquatica** L. – Sol., localized; per-hydrophyte; PrPal.
- V. austriaca** L. – Cop.1, localized; sub-mesophyte; PrSt.
- V. chamaedrys** L. – Cop.1, sporadically; mesophyte; SilSt.
- V. incana** L. – Sp., localized (on the sand soils), RRKh; sub-mesophyte; (Hal)StPr.
- V. prostrata** L. – Sp., localized; sub-mesophyte; SilSt.
- V. teucrium** L. – Sp., localized; mesophyte; PrSil.
- VICIA tenuifolia** Roth – Cop.2, localized; sub-mesophyte; StPr.
- VIOLA ambigua** Waldst. et Kit. – Cop.1, sporadically; mesophyte; SilSt.
- VISCARIA viscosa** L. – Sol., localized; sub-mesophyte; SilStPr.
- XANTHIUM albinum** (Widd.) Scholz & Sukopp – Sol., localized, Adv. (Xen); hygro-mesophyte; PrRu.

Discussion

According to the results of our research we defined that the flora of the reserve contains 206 species belonging to 47 families of vascular plants. Among them, 205 species (99.5% of the flora) belong to the Magnoliophyta division and 1 (0.5 %) – belongs to the Pinophyta division (*Pinus sylvestris*). Most of the species (174 species; 84.5 %) belong to Magnoliopsida class and considerably less (31 species; 15.0 %) belong to Liliopsida class. Asteraceae (35 species; 16.9 %), Poaceae (20 species; 9.7 %), Fabaceae (20 species; 9.7 %), Lamiaceae (19 species; 9.2 %), Scrophulariaceae (13 species; 6.3 %), Rosaceae (9 species; 4.3 %) Ranunculaceae (7 species; 3.4 %), Apiaceae, Boraginaceae, Rubiaceae (each one contains 6 species; 2.9 %) are the lead families in the reserve flora. Other families are

represented by 5 and less number of species. This pattern of systematic structure of the flora is typical for the Holarctic flora kingdom herbaceous phytocoenoses [TOLMACHEV, 1974]. The biggest genera are *Salvia* (*S. aethiopsis*, *S. nemorosa*, *S. nutans*, *S. pratensis*, *S. stepposa*, *S. verticillata*) and *Veronica* (*V. anagalis-aquatica*, *V. austriaca*, *V. chamaedrys*, *V. incana*, *V. prostrata*, *V. teucrium*). *Artemisia* (*A. absinthium*, *A. austriaca*, *A. hololeuca*, *A. marschalliana*, *A. vulgaris*) and *Trifolium* (*T. arvense*, *T. fragiferum*, *T. medium*, *T. montanum*, *T. pratense*) have 5 species in each one. At least 4 species are contained the genera *Achillea* (*A. nobilis*, *A. ochroleuca*, *A. stepposa*, *A. submillefolium*), *Allium* (*A. flavescens*, *A. oleraceum*, *A. rotundum*, *A. sphaerocephalon*), *Centaurea* (*C. carbonata*, *C. jacea*, *C. orientalis*, *C. micranthos*), *Elytrigia* (*E. intermedia*, *E. repens*, *E. stipifolia*, *E. trichofora*), *Galium* (*G. octonarium*, *G. palustre*, *G. tinctorium*, *G. verum*) and *Potentilla* (*P. anserina*, *P. argentea*, *P. patula*, *P. pilosa*). Other genera are presented by 3 and less number of species.

The analysis of the rare fraction of the flora showed that it contains 25 rare and protected species and it is 12.6 % of the flora. Most of them (15 species) are regionally rare and they are protected in the Kharkiv region [OFFICIAL LISTS...,2012], 10 of them are included to The Red Data Book of Ukraine [THE RED DATA...,2009]. Among them, 11 species (*Androsace kozo-poljanskii*, *Artemisia hololeuca*, *Asperula tephrocarpa*, *Centaurea carbonata*, *Erucastrum cretaceum*, *Hyssopus cretaceus*, *Koeleria talievii*, *Linum ucrainicum*, *L. hirsutum*, *Silene supine*, *Thymus calcareus*) are the typical cretophilic plants and grow only on the chalk substrate or on the soils with the high content of carbonates. Other protected species are representatives of the steppe habitats (*Allium flavescens*, *Anemone sylvestris*, *Anthyllis macrocephala*, *Elytrigia stipifolia*, *Hypericum elegans*, *Pulsatilla pratensis*, *Salvia aethiopsis*, *S. nutans*, *Stipa capillata*, *S. pennata*, *Veronica incana*).

During the expedition in 2020, we noted that the vegetation cover of the floodplain and the oxbow lake was disturbed by economic activities. Among the common species, the subpopulation of the regionally rare plant *Inula helenium* was destroyed. Also we detected the heavy equipment traces on the chalk slopes. Eventually this territory can be destroyed, if it is not included to The Nature Reserve Fund of Ukraine.

Conclusion

Thus, we studied territory of the chalk outcrops and adjacent habitats. It was detected that the protected reserve contains 206 species. The widest families are Asteraceae (16.9 %), Poaceae (9.7 %), Fabaceae (9.7 %), Lamiaceae (9.2 %), Scrophulariaceae (6.3 %), Rosaceae (4.3 %), Ranunculaceae (3.4 %), Apiaceae, Boraginaceae, Rubiaceae (each one 2.9 %). Those families predominance is typical for Holarctic Floristic Kingdom. The studied area has a high zoological value as a habitat of plant species protected at the national and regional levels. We found 25 species protecting in regional and national level (15 species are regional rare and 10 species are included to The Red Data Book of Ukraine). Given that in 2020, part of the studied area underwent economic activity, as well as the high zoological value of this territory we recommend including this territory in the network of The Nature Reserve Fund as a local botanical reserve "Vovchi Vody".

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References

ANDRIENKO T.L., PEREGRYM M. M. (2012). Kharkivska oblast. In: *Official lists of regional rare plants of administrative territories of Ukraine (reference book)*, 119–125. Kyiv: Alterpress. (in Ukrainian)

- BEZRODNOVA O.V. (2014). Rare calciphilic species in V.N.Karazin Kharkiv National University Herbarium (CWU). *The journal of V. N. Karazin Kharkiv National University. Series "Biology"*, **25**: 16–26. (in Russian)
- BONDARENKO H.M., SIRA O.E. (2018). The preliminary results of the cretaceous flora analysis from the vicinity of Vovchansk town (Vovchansk district, Kharkiv region). «*Biology: from a molecule up to the biosphere*»: proceedings of the 13th International young scientists' conference. Kharkiv: 28–30 November: 135.
- BONDARENKO H., SIRA O., DARMOSTUK V. (2019). The cretaceous outcrops in the vicinity of Vovchansk town (Kharkiv region) like a perspective territories of Emerald Network. *Fauna Ukrainy na mezhi XX-XXI st. Stan i bioriznomanittia ecosystem pryrodokhoronnykh terrytorii. Lviv-Shatsk: 12-15 September 2018*: 37–38. (in Ukrainian)
- CZERNIAEW B.M. (1859). *Conspectus plantarum circa Charcoviam et in Ucraina sponte crescentium*. Kharkov: Universitetskaia tipografiia, 90 p. (in Russian)
- DIDUKH YA.P., SHELYAG-SOSONKO YU.R. (2003). Geobotanical zoning of Ukraine and adjusting territories. *Ukr. Bot. J.*, **60** (1): 6–17. (in Ukrainian)
- DRUDE G.O. (1890). Über die Principien der Unterscheidung von Vegetationsformationen, erläutert an der centraleuropäischen Flora. *Botanische Jahrbuch*, **11**: 21–51. (in German)
- FILATOVA O.V. (2012). Rare phytobiota on the cretaceous substrata of the natural protected areas in kharkiv region. *The Plant Kingdom in the Red Data Book of Ukraine: Implementing the Global Strategy for Plant Conservation – Proceedings of II International Conference. Uman': 9-12 October*. 181–183. (in Ukrainian)
- GAMULYA YU.G., BITYUTSKA V.V., LOSEVA N.L. (2017). Phitosozological evaluation of the flora of a perspective botanical reserve of local significance "Zapadne" (Dvurechansky district, Kharkiv Region). *Biology and Valeology*, **19**: 98–106. (in Ukrainian)
- GORELOVA L.N., DRULYOVA I.V., GRAMMA V.M. (1993). Do pytannia okhorony roslynosti kreidianykh vidslonen Pivnichnoho Skhodu Ukrainy. *Ecolohichni osnovy optymiztsii rezhymu okhorony i vykorystannia Pryrodno-zapovidnoho fondu: Rakhiv*. 144–146. (in Ukrainian)
- GORELOVA L.N., GORELOVA E.I. (2003). Vegetation cover of cretaceous outcrops of the planned National Nature Park "Dvurechanskiy". *Nauchnye issledovaniia na territoriakh Prirodno-zapovednogo fonda Kharkovskoi oblasti. Kharkov*. 23–28. (in Russian)
- KLOKOV M.V. (1947). Endemism Ukrainskoi Flory. DSc thesis. Leningrad: V. L. Komarov Botanical Institute. (in Russian)
- KOZO-POLYANSKY B.M. (1931). *V strane zhyvykh iskopaemykh. Ocherk iz istorii gornykh borov na stepnoi ravnine*. Moscow: Gos. Uchebno-pedag. izd-vo, 184 p. (in Russian)
- KOTOV M.I. (1939). Flora and Vegetation of Cretaceous Outcrops in the Donets Bassin and their Application in Africulture. *Journal de l'Institut Botanique de l'Acad. Des Sciences de la RSS d'Ukraine*, **21–22** (29–30): 221–241. (in Ukrainian)
- LAVRENKO E.M. (1930). Les centres de la conservation des relicts sylvestres tertiare entre les Carpathes et l'Altai. *Journal de la Societe Batanique de Russie*, **15** (4): 351–363
- LITVINOV D.I. (1902). O reliktovom kharaktere flory kamenistykh sklonov v Evropeiskoi Rossii. *Tr. Bot. Muzeia Imp. Acad. Nauk.*, **2** (1): 76–109. (in Russian)
- MOSYAKIN S.L., FEDORONCHUK M.M. (1999). Vascular plants of Ukraine. A nomenclatural checklist. Kyiv: 346 p.
- PARNIKOZA I. (2008). Conservation of Ukrainian steppes: what can be done today? *Proceedings of the Theriological School*, **9**: 53–62. (in Ukrainian)
- SUKATSCHIEFF W. (1902). Zur Flora des Gouvernements Charkow. *Izvestiia Imp. SPb. Bot. Sada*, **2** (5): 154–168. (in Russian)
- TALIEV V.I. (1905). Rastitelnost melovykh obnazhenii Yuzhnoi Rossii. Travaux de la Societe des naturalistes a l'Universite Imperiale de Kharkow. T. XL, Issue 1. Kharkov: Kharkovskii Listok, 229 p. (in Russian)
- TOLMACHEV A.I. (1974). *Vvedenie v geografiyu rasteniy*. Leningrad: Izd-vo Leningr. Un-ta. 244 p. (in Russian)
- RED Data Book of Ukraine. Vegetable Kingdom (2009). Didukh Ya.P. (ed). Kyiv: Globalconsaltyng, 912 p. (in Ukrainian)
- ZOLOTUKHIN N.I., ZOLOTUKHINA I.B., FILATOVA T.D., RYZHKOVA G.A. (1997). Redkiiie stepnye rasteniia na zapovednom uchastke Stenki-Izgoriia (Belgorodskaia oblast). *Problemy relictov Srednerusskoi lesostepi v biologii i landshafnoi geografii: Materialy nauchnoi konferentsii, posviashchennoi 100-letiiu so dnia rozhdeniia S.V. Golitsyna. Voronezh*. 29–34.