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STATE AND PROSPECTS OF OPTIMIZATION THE PLANT COVER OF HYDROPHILIC ECOTOPES OF THE POLTAVA BOTANICAL GARDEN

The floristic and coenotic features of the plant cover of hydrophilic ecotopes (stream and pond) on the territory of Poltava V.G. Korolenko National Pedagogical University's Botanical Garden were studied. It was found that hydrophilic plant cover undergoes significant anthropogenic transformation: a poor composition of flora and communities of macrophytes, excessive overgrowing of water area, hyperproduction of filamentous algae indicate the violation of ecological balance in the pond ecosystem; in coastal flora of creek and pond the high participation of ruderal and alien elements takes place.

The recommendations to optimization the state of the plant cover of hydrophilic ecotopes were given. To optimize the pond ecosystem of Botanical Garden is expedient to recommend reconstruction of hydraulic structures to improve water circulation, control of the sources of pollution and hydrochemical monitoring of catchment area, correction areas of overgrowing the water surface (especially by free floating vegetation and filamentous algae), study the whole biota of aquatic biocenosis and its impact on the given ecosystem, phytosanitary control the spread of weeds, especially alien, streamlining and compliance with the regime of water protection zone, cultivation of helophytes communities on the principle of bioplato. Among measures of optimization the vegetation cover of coastal space should be noted mowing of herbaceous vegetation along the perimeter and placing the curtains of decorative hygrophilous plants, felling and control the spontaneous spreading of shrubs and trees.

On the basis of the established ecological conditions of studied ecotopes the specific recommendations for their greening are given. In view of the decorative and sozological aspects of hydrophilic flora of the Left-bank Forest-steppe and biological features of some aquatic introducers the list of plants, that are promising for cultivation ex situ, proposed.

Key words: *Poltava, Botanical Garden, stream, pond, hydrophilic vegetation, aquatic and coastal flora, greening.*

Introduction. The Poltava Botanical Garden is a green adornment of Poltava city and contemporary educational and scientific base of the Faculty of Natural Sciences of Poltava V.G. Korolenko National Pedagogical University . It is located in the picturesque countryside of eastern part of the city. The object has the status of the park-monument of landscape architecture of local importance and in its current limits covers an area of 5,25 hectares.

In the structure of modern Botanical Garden are arboretum, greenhouse, floral department of decorative plants with collection areas, exposition the Museum of Ukrainian Flowering under the open sky, green class, alpine slide, department of agricultural and medicinal plants and fruit garden. Overall the collection of botanical garden has over 1500 species, varieties and forms of plants, including about 500 taxa at open and about 600 ones – at closed ground [2, 6].

Analysis of structure of the Poltava Botanical Garden and variety of flora grown it gives reason to state that the main types of vegetation of different geographical zones of Ukraine and of the world occupy the leading place in its exposition. At the same time azonal elements (meadow, swamp and aquatic vegetation) in the collection are minimal, but have considerable potential for expanding [3], as the landscape conditions here are favorable for them because of presence the hydrophilic ecotopes – a stream and a small water body (fig. 1). This, in turn, is caused by the fact that the Botanical Garden is located on the slopes of ravine formed the right tributary of the Tarapunka River (basin of the River Vorskla).

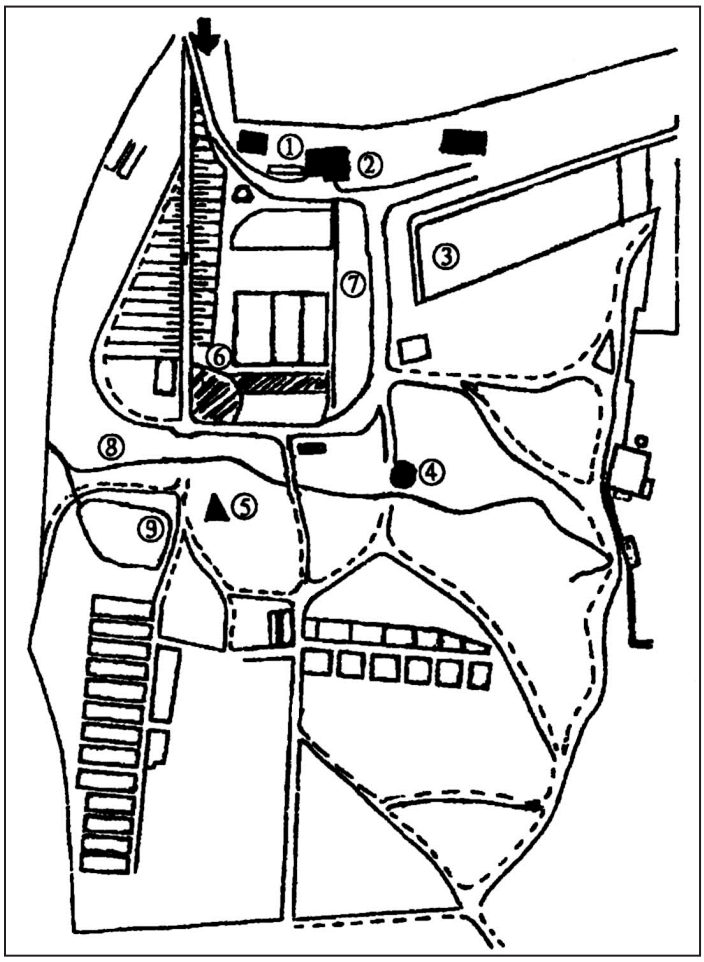

Fig 1. **Map-scheme of the Botanical Garden of Poltava V.G. Korolenko National Pedagogical University:**
1, 2 – buildings;
3 – greenhouse;
4 – alcove;
5 – wellspring;
6 – exposition of Ukrainian Flowering;
7 – rockery;
8 – stream;
9 – water body.

In the scientific literature on Poltava Botanical Garden [1-3, 6, 8] are only a few references to the stream and pond, but concrete data about these objects and their vegetation is almost absent.

In 2012 we studied the floristic, coenotic and ecological features of a pond of the Poltava Pedagogical University's Botany Garden, gave the recommendations to optimize the condition of this ecosystem and proposed a list of hydrophilous plant species, which are perspective for growing *ex situ* [10], but it was remained out of sight the state of the watercourse and flood plain, the issue of their ordering.

At the same time the hydrophilic ecotopes of Poltava Botanical Garden characterize by diversity of flora and fauna and may be convenient objects to make excursions of natural sciences for pupils students [5], field environmental practices of students [9], and have significant landscape and aesthetic potential, able greatly to increase the recreational attractiveness of Poltava Botanical Garden and its scientific and educational value. The importance of preservation and development of these ecotopes related to their location among densely populated areas of the city, from the position of optimization of the entire urban area of Poltava and strengthening its «green carcass». Therefore **the aim of this work** is to study the vegetation cover of hydrophilic ecotopes complex of Botanical Garden with outlining the prospects for its greening.

Materials and methods. Current research conducted in the field season of 2015 and early in the season of 2016 using traditional hydrobotanical methods [7]. Counting of line parameters and areas of undergrowing of water body by hydrophilic vegetation implemented using software resources Digimizer to space aerial images received through the service Google Earth, by comparison with field data. Investigation of environmental indices of stream and water body conducted through standard procedures [14, 17]. Suggestions of optimization of plant cover of hydrophilic ecotopes based on specific recommendations [11, 19].

Results and their discussions.

The stream of Botanical Garden has a leak in the central part of the city, approximately of 600 m upstream, and falls to the river Tarapunka near the Monastyrska hill about 700 meters below. The lower part of the flow to the mouth goes into the underground collector. According to the hydrological description of this watercourse [18], the total length of stream – 1,6 km, the average slope – 5,61 m/km, the width of the bed – 0,5-1,0 m, the depth is about 0,5 m. Drain of water occurs throughout the year. In the bed and floodplain there are seven hidraulic structures, the most of which are ponds. At present boundaries of botanical garden there are about 275 meters of the stream. From the materials of «Development of scientific recommendations for the reconstruction of the garden of Poltava Pedagogical Institute» (1988) we know, that the difference altitudes at this site of the stream makes from 125 m to 117 m, and the maximum height on the slopes of its valley – 136 m (for northern slope) and 140 meters (to the south). According to our measurements, the width of the stream is 0,3-0,5 m, depth – 0,2 m, the flow velocity is about 0,25 m for a second, the water is clear (the index of Snellen's transparency is 30 cm). The bed is practically not overgrown, but there are local plots with thickets of macrophyte algae *Cladophora* sp., which projective coverage (PC) does not exceed 30%.

At the territory of Botanical Garden the valley of the stream is relatively narrow (30 m), the floodplain is inexpressive, 15-20 m wide, the slopes of valley are high enough (an average of 3-4 m) and sometimes steep. Most of the floodplain is overgrown with trees and shrubs based on *Acer negundo* L. and *Robinia pseudoacacia* L. Decorative value of this area enhanced by the individual copies of shrubs and trees of *Salicaceae*, particularly the hung form of *Salix alba* L. The shrubs of *Viburnum opulus* L. are planted and some trees of *Malus domestica* Borkh grow near the wellspring.

Herbaceous cover of the floodplain in whole formed spontaneously, although in some places it exposed mowing. The tall plants dominate – *Rumex* × *pratensis* Mert. & W.D.J. Koch *(R. crispus* × *R. obtusifolius)*, *Anthriscus sylvestris* (L.) Hoffm., *Chenopodium urbicum* L., *Urtica dioica* L., *Arctium lappa* L. та *A. tomentosum* Mill., *Sonchus arvensis* L., *Dipsacus strigosus* Willd. ex Roem. and so on, in which climbing stems of *Humulus lupulus* L., *Calystegia sepium* (L.) R.Br., *Rubus caesius* L., and in some places invasive *Echinocystis lobata* (Michx.) Torr. & Gray extend. Moreover, the slopes of the valley in some places decorated with climbing shoots of *Parthenocissus quinquefolia* (L.) Planch.

The lower grassy sublayer is formed by *Geum urbanum* L., *Lapsana communis* L., *Plantago major* L., *Taraxacum officinale* Wigg. aggr., *Chenopodium album* L., *Chelidonium majus* L., *Ambrosia artemisifolia* L., *Xanthoxalis stricta* (L.) Small. Among grasses the most notable are *Elytrigia repens* (L.) Nevski, *Dactylis glomerata* L., *Festuca gigantea* (L.) Vill., *Digitaria sanguinalis* (L.) Scop.

Along the banks of the stream hydrophilic forbs are represented by *Ranunculus repens* L. and *R. sceleratus* L., *Sium sisaroideum* DC., *Persicaria hydropiper* (L.) Delarbre and *P. maculosa* S.F. Gray, *Epilobium palustre* L., *Lysimachia nummularia* L., *Myosoton aquaticum* (L.) Moench, *Bidens frondosa* L., *Impatiens glandulifera* Royle, in some places hydrophilic grasses are also marked – *Catabrosa aquatica* (L.) P. Beauv. and *Glyceria notata* Chevall.

The lower part of the floodplain (on the eastern edge of the park) is a swampy plot of about 1500 m^2 with the dominance in grassy layer of *Scirpus sylvaticus* L., high participation of *Carex* sp. and *Impatiens glandulifera* as well as climbing herbs – *Humulus lupulus*, *Calystegia sepium*, *Echinocystis lobata*. The plot is interesting as an example of wetlands and requires minimal regulation in order to provide ability of access for its study.

The water body, near the stream, occupies an important place in the structure of the Botanical Garden and the system of its hydrophilic ecotopes. It is located in the western part of the Botanical Garden, on super flood-plain terrace of the stream, from which it feeds through water-filled communication and is delimited by an earthen dam. It is an earth reservoir of almost right rectangular shape elongated from east to west at 37 m. According to the water economic passport of this pond (2007), its water surface area is 700 m^2, average depth – 1,9 m, maximum depth – 2,7 m. The perimeter of the pond is about 100 m. The water body has a weak-flowing regime due to return of water lower to stream through the discharge pipe. Water clarity in the growing season amounts 60 cm. The overgrowing degree by higher aquatic vegetation at the beginning of the growing season (April) is about 15% (mainly due to thickets of helophytes), in the period of maximum development of aquatic vegetation it reaches 100% (through free floating cenoses). The bottom sediments are loams in combination with silt.

The higher aquatic vegetation of pond characterized by unvaried floristic and coenotic composition. Aquatic flora includes only 7 species of higher macrophytes belonging to various ecological groups. Thus, all water area of pond covered with free-floating vegetation on the basis of *Spirodela polyrrhiza* (L.) Schleid and *Lemna minor* L. with almost equal participation of every specios and total PC to 100%. Hydrophytes free floating in the water presented by sparse thickets of *Ceratophyllum demersum* L. (PC within 10%), rooted submerged hydrophytes presented by solitary specimens of *Potamogeton crispus* L. The helophyte's belt is scrappy, consists of sparse (PC to 60%, the density of thickets of dominant is 65 specimens for m^2) 0,5-1(3) m in wide communities of *Typha latifolia* L.*,* among them there are some specimens of *Rumex hydrolapathum* Huds. and *Lythrum salicaria* L. Thickets of air-water vegetation distributed along almost half of perimeter of the pond, which creates conditions for forming of decorative compositions with aquatic plants without needing a significant correction of existing helophyte's communities (fig 2.).

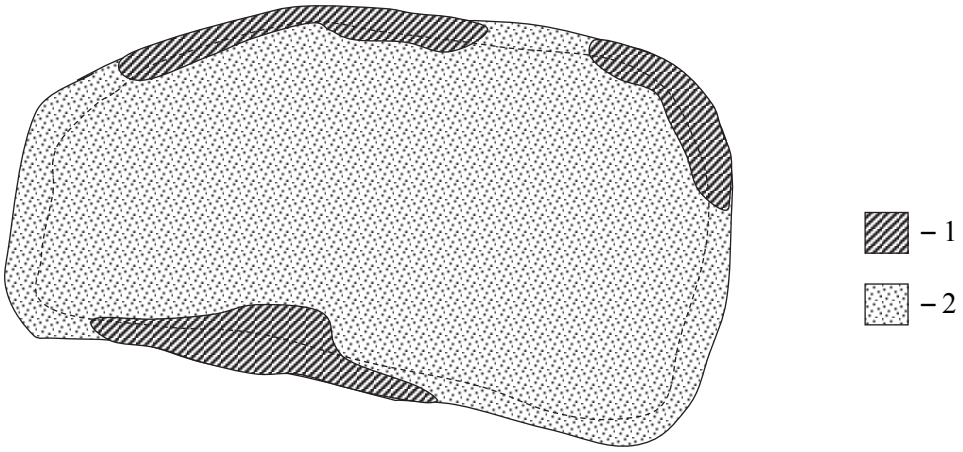

Fig 2. **The scheme of overgrowing the reservoir of Botanical Garden:**
1 – the communities of Typha latifolia, 2 – the communities of Lemna minor + Spirodela polyrrhiza; a dotted line shows the zone of spread of submerged vegetation on the basis of filamentous algae.

At the bottom of the reservoir it was marked a strong layer of filamentous algae, which actively vegetate in the second half of spring and early summer before the development of free floating vegetation and after vegetation emerge on a water surface. Active eating of aquatic vegetation by fish is insufficient factor for removal of excess phytomass, as evidenced by heavy siltation of bottom soils. This points to the necessity of regular clearing of a pond. The last time these measures were conducted in 2006.

The air-water vegetation produces the main share of macrophyte phytomass (92,4%), the free-floating vegetation provides 6,3% and the submerged vegetation (mainly filamentous algae) – only 1,3%.

The air-dry phytomass of macrophytes is about 0,68 kg/m^2 of water area, but the biggest burden falls to the coastal areas, where 1 m^2 of submerged and air-water thickets produce more than 4 kg of phytomass, which significantly exceed value (till 1,5 kg/m^2), established as optimal for forming of good water quality [4].

Compared to 2012 in the structure of aquatic vegetation it were found some insignificant changes. Thus free floating communities still formed entirely from *Spirodela polyrrhiza*, which now codominates with *Lemna minor*. This may indicate a slight decrease of eutrophication processes in the reservoir, as the optimal trophical level of water environment for *L. minor* is slightly lower than for *S. polyrrhiza* [12]. But in any case, the spatial distribution of duckweed thickets in the reservoir is excessive, creating a shading the soil, hampering overgrowth of other plant species and limiting settlement of invertebrates. This accumulates the considerable biomass that needs the mechanical removal. In addition, it is marked a slight increase in the area of *Typha latifolia* communities that signals the gradual process of pond waterlogging [13].

Among the hydrophilic forbs that grow along the water's edge and the banks of the stream with variable levels of moisture, it should be note *Ranunculus repens, Myosoton aquaticum, Lycopus europaeus* L.*, Rumex* × *pratensis*, *Persicaria maculosa, Solanum dulcamara* L.*, Calystegia sepium, Sonchus palustris* L.*, Eupatorium cannabinum* L., *Tussilago farfara* L.*, Impatiens glandulifera*.

The plant cover of adjacent to the reservoir area represented by meadows on the basis of *Elytrigia repens, Poa pratensis* L.*, Trifolium repens* L.*, Dactylis glomerata* L.*, Glechoma hederacea* L. The close growth of trees causes the presence of skirt elements (*Aegopodium podagraria* L.*, Geum urbanum, Lamium maculatum* (L.) L.*, Dipsacus strigosus)*. The participation of ruderal species of local flora (*Polygonum aviculare* L.*, Plantago major, Taraxacum officinale, Sisymbrium officinale* (L.) Scop.*, Arctium tomentosum, Heracleum sibiricum* L.*, Urtica dioica, Chelidonium majus, Cirsium setosum* (Willd.) Besser*)*, and some invasive species as well (*Ambrosia artemisifolia, Phalacroloma annuum* (L.) Dumort.) is especially noticeable. Herbaceous cover around the pond is fragmentary mowed.

An arborescent layer on the shore of the pond represented by a group of trees *Picea abies* (L.) Karst.*,* as well as individual specimens of *Salix alba, Juglans regia* L.; it is marked spontaneous regrowth of *Ulmus minor* Mill. and adventitious *Acer negundo.* The shading of water surface area is about a third of the pond square.

Conclusions and recommendations.

So, as our servy showed, in the flora of stream floodplain the high participation of ruderal (*Chenopodium urbicum* and *Ch. album L., Urtica dioica, Arctium lappa* and *A. tomentosum, Anthriscus sylvestris, Chelidonium majus* etc.) and adventitious (*Ambrosia artemisifolia, Xanthoxalis stricta, Echinocystis lobata, Bidens frondosa, Impatiens glandulifera* etc.) elements takes place, that indicates the anthropogenic transformation of natural vegetation.

Streamlining of the floodplain may involve strengthening of decorative role of the watercourse by mowing of tall weeds in the flooded area and cleaning it from excessive spreading of trees and shrubs, decorating shoreline with stubs of trees and tree bark, rough stone, gravel, sand and so on. To enhance decorative accents can use a certain aesthetically attractive hydrophilic species of wild and cultivated flora – *[2]*Inula helenium* L., *Iris pseudacorus* L.*, Acorus calamus* L., *Lythrum salicaria* L.*, Filipendula vulgaris* Moench.*,* **Bistorta officinalis* Delarbre, **[3]*Iris sibirica* L., **Matteucia struthiopteris* **(**L.) Tod.*, Phalaroides arundinacea* (L.) Rausch*, Molinia caerulea* (L.) Moench, *Alopecurus aequalis*

[2] one asterisk (*) denotes species that are rare in Poltava region [15].
[3] two asterisks (**) denote species listed in the Red Book of Ukraine [20].

Sobol., *Juncus effusus* L., representatives of genera *Hosta* Tratt., *Hemerocallis* L. As planting material it is also important to maximize the use of floristic diversity available on the territory of Botanical Garden.

In the Botanical Garden's pond ecosystem it can be stated the features of violation of ecological balance: poor composition of flora and communities of macrophytes, excessive overgrowing of water area, hyperproduction of filamentous algae, high share of weeds at a coastal zone. The reasons for this may be a contamination of water of the stream flowing through populated mostly with private buildings area, secondary water pollution of pond during dying off of vegetation in conditions of weak flowing, receipt of organic substances in surface runoff from agrocenoses, destroying the integrity of plant cover at adjacent to reservoir areas because of trampling, littering and so on.

To optimize the pond ecosystem of Botanical Garden is expedient to recommend reconstruction of hydraulic structures to improve water circulation, control of the sources of pollution and hydrochemical monitoring of catchment area, correction areas of overgrowing the water surface (especially by free-floating vegetation and filamentous algae), study the whole biota of aquatic biocenosis (phyto- and zooplankton, periphyton, benthic invertebrates, ichthyofauna, etc.) and its impact on the given ecosystem, phytosanitary control the spread of weeds, especially alien, streamlining and compliance with the regime of water protection zone, cultivation of helophytes communities on the principle of bioplato [16].

Among measures of optimization the vegetation cover of coastal space should be noted mowing of herbaceous vegetation along the perimeter and placing the curtains of decorative hygrophilous plants, felling and control the spontaneous spreading of shrubs and trees.

A complete use of water bodies on the territories of botanical gardens involves growing there the different species of water and riparian-water plants, including rare and valuable for landscaping. Pond with cultivated there vegetation from an environmental point of view is an artificial community or agrocenosis that to maintain the decorative effect needs regular care by human and can serve as testing ground for experimental researches. When planning thickets should keep in mind that for the normal functioning of ecosystem of the reservoir and its aesthetic appearance plants should cover about a third of the water area [4]. Plants intended for decoration of the coastal zone must comply with the reservoir size and compositionally well combined. Excessive amounts of coastal plants, especially large, visually reduces the area of the reservoir. Among plenty of variants should be preferred those that retain a decorativeness of spring to late autumn and is not too demanding [19]. Species that are prone to strong growth, it is advisable to place at the bottom in pots [11]. Thus, the selection of the species composition of cultivated hydrophilic flora should be carried out based on the biological and ecological, decorative, ameliorative characteristics of individual species and their sozological specifics in a region and environmental conditions of reservoir.

For the water body of Poltava V.G. Korolenko National Pedagogical University's Botanical Garden on the analysis of examined above features of ecotope and decorative and sozological aspects of hydrophilic flora of Left-bank forest-steppe is advisable to recommend the growing of following species:

- *at a zone of submerged plants* (including the presence of shallow areas and sufficient water clarity and luminosity as well as in order to counter the development of filamentous

algae): *Myriophyllum spicatum* L., **Utricularia vulgaris* L., *Hottonia palustris* L., *Batrachium circinatum* (Sibth.) Spach., *B. trichophyllum* (Chaix) Bosch, *B. aquatile* (L.) Dumort. and other;

- *at a zone of plants with floating leaves* (given the weak flow hydrological regime and insignificant fluctuations of the water level): **Nymphaea alba* L., *Nuphar lutea* (L.) Smith, *Potamogeton natans* L., *Persicaria amphibia* (L.) Delarbre, ***Salvinia natans* (L.) All., *Hydrocharis morsus-ranae* L. and other;
- *at a zone of coastal and swamp plants* (including the presence of *Typha latifolia's* thickets and fairly dense crones of trees framing the coast, the preference is given to medium- and low macrophytes): *Butomus umbellatus* L., *Alisma plantago-aquatica* L., *Sagittaria sagittifolia* L., *Cyperus glomeratus* L., *Hippuris vulgaris* L., *Veronica beccabunga* L., **Parnassia palustris* L., **Menyanthes trifoliata* L., **Calla palustris* L., **Caltha palustris* L., **Trollius europaeus* L., **Potentilla palustris* (L.) Scop., *Myosotis scorpioides* L., *Mentha aquatica* L., *Cardamine amara* L. and other.

Some tropical introduced species, such as *Eichhornia crassipes* (Mart.) Solms., *Pistia stratiotes* L., are also promising for growing in conditions of the Botanical Garden. Because of their high productivity and excessive invasiveness they should cultivated in isolation: in summer – in tubs with water near the pond or stream, and in winter – in a greenhouse (in particular pistiya today is cultivated in greenhouses of Botanical Garden).

The implementation of the aforementioned measures of greening of hydrophilic ecotopes will not only replenish the collection of decorative plants of open ground and enrich the gene pool of rare hydrophilic flora, but definitely enhance the landscape and aesthetic, scientific and educational value of Poltava Botanical Garden as a whole.

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СТАН І ПЕРСПЕКТИВИ ОПТИМІЗАЦІЇ РОСЛИННОГО ПОКРИВУ ГІДРОФІЛЬНИХ ЕКОТОПІВ ПОЛТАВСЬКОГО БОТАНІЧНОГО САДУ

Досліджено флоро-ценотичні особливості рослинного покриву гідрофільних екотопів (струмка і ставу) на території ботанічного саду Полтавського національного педагогічного

університету імені В.Г. Короленка. З'ясовано, що гідрофільний рослинний покрив зазнає помітної антропогенної трансформації: про порушення екологічної рівноваги в екосистемі водойми свідчать бідний склад флори та угруповань макрофітів, надмірне заростання акваторії, гіперпродукція нитчастих водоростей; у флорі навколоводного простору струмка і водойми відзначено високу участь рудеральних та адвентивних елементів.

Наведено пропозиції щодо поліпшення рослинного покриву гідрофільних екотопів. Для оптимізації стану екосистеми ставу ботанічного саду доцільно рекомендувати проведення реконструкції гідроспоруд для покращення водообміну, контроль джерел забруднення та гідрохімічний моніторинг на території водозбору, корегування площ заростання водного дзеркала (насамперед, вільноплаваючою рослинністю та нитчастими водоростями), вивчення та облік повного складу біоти водного біоценозу та його впливу на стан даної екосистеми, фітосанітарний контроль поширення бур'янів, особливо адвентивних, упорядкування та дотримання режиму водоохоронної зони, культивування угруповань гелофітів за принципом біоплато. Серед заходів оптимізації рослинного покриву навколоводного простору струмка і водойми слід відзначити викошування трав'янистої рослинності уздовж усього периметру та розміщення куртин декоративних вологолюбних рослин, вирубування та контроль стихійного поширення чагарників і дерев.

На підставі аналізу встановлених екологічних умов досліджених екотопів наведено конкретні рекомендації для їх озеленення. З урахуванням декоративних і созологічних аспектів гідрофільної флори Лівобережного Лісостепу та біологічних особливостей деяких водних інтродуцентів запропоновано перелік видів рослин, перспективних для вирощування *ex situ.*

Ключові слова: *Полтава, ботанічний сад, струмок, водойма, гідрофільна рослинність, водна та навколоводна флора, озеленення.*

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СОСТОЯНИЕ И ПЕРСПЕКТИВЫ ОПТИМИЗАЦИИ РАСТИТЕЛЬНОГО ПОКРОВА ГИДРОФИЛЬНЫХ ЭКОТОПОВ ПОЛТАВСКОГО БОТАНИЧЕСКОГО САДА

Исследованы флоро-ценотические особенности растительного покрова гидрофильных экотопов (ручья и пруда) на территории ботанического сада Полтавского национального педагогического университета имени В.Г. Короленко. Выяснено, что гидрофильный растительный покров подвержен заметной антропогенной трансформации: о нарушении экологического равновесия в экосистеме водоема свидетельствуют бедный состав флоры и растительности макрофитов, чрезмерное зарастание акватории, гиперпродукция нитчатых водорослей; во флоре околоводного пространства ручья и пруда отмечено высокое участие рудеральных и адвентивных элементов.

Приведены пропозиции по улучшению растительного покрова гидрофильных экотопов. Для оптимизации состояния экосистемы пруда ботанического сада целесообразно рекомендовать проведение реконструкции гидросооружений для улучшения водообмена, контроль источников загрязнения и гидрохимический мониторинг на водосборной площади, корректирование площадей зарастания водного зеркала (прежде всего, свободноплавающей

растительностью и нитчатыми водорослями), изучение полного состава биоты всего водного биоценоза и его влияния на состояние данной экосистемы, фитосанитарный контроль распространения сорняков, в особенности адвентивных, благоустройство и соблюдение режима водоохранной зоны, культивирование сообществ гелофитов по принципу биоплато. Среди мер оптимизации растительного покрова околоводного пространства ручья и водоема следует отметить выкашивание травянистой растительности вдоль всего периметра и размещение куртин декоративних влаголюбивых растений, вырубывание и контроль стихийного распространения кустарников и деревьев.

На основании анализа установленнях экологических условий исследованных экотопов приведены конкретне рекомендации по их озеленению. С учетом декоративных и созологических аспектов гидрофильной флоры Левобережной Лесостепи и биологических особенностей некоторых водных интродуцентов предложен перечень видов растений, перспективних для выращивания *ex situ.*

Ключові слова: *Полтава, ботанический сад, ручей, водоем, гидрофильная растительность, водная и околоводная флора, озеленение.*