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STREET PLANTINGS OF VISHGOROD TOWN, KIEV REGION

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The results of street landscaping research at the Vyshgorod town, Kyiv region are given. The assortment of tree species were researched, and their occurrence and ornamental state were evaluated.

Street planting, tree species, condition, ornamental state.

The estimation of state of urban areas involves the use of three groups of indicators of sustainable development: environmental, economic and social. The least studied and sientific rationalized among them are indicators of environmental groups, despite the fact that they play a major role in the formation of a balanced assessment of the urban area [1]. At present, investigation of the ecological state of urban areas concerned mainly large cities, small towns practically not been investigated [2].

For a realistic assessment of situation in small towns first of all need have information about the current system of the green spaces, wich is closely related with their planning structure. According to M. Luse [3], in small towns usually there are sufficient green areas and the main task is not to increase the area of plantations, and providing conditions for their preservation and more intensive use. However, the requirement is that the green spaces must form continuous spatial system, in particular, owing to street landscaping, is actual for areas of small towns.

Objective of the research was to identify and analyze of the level of street landscaping, the assortment, main accounting items and state of tree and shrub species of the small towns Vyshgorod, Kyiv region.

Materials and methods of the research. The technical inventory of green spaces in Vyshgorod town was not carried out and to obtain any dates about the state of urban spaces has not been possible. Our research were based on satellite map of public shooting GoogleMaps. Acordin to it were selected streets for research on all categories of streets in the territories of different function use.

Inventory of trees with determining of species composition, condition and ornamental state of street plantings was carried out along 200 m or along entire length of each experimental street. Total number of accounts streets ¬ 14, their length - more than 3 km, more than 600 trees were described.

Was estimeted state of trees on the base of a 5-point scale of visual assessment of tree plants in street stands, according to wich 1 - tree is in excellent condition as it was applied in similar studies [4]. Ornamental state of plants was determined visually on a 4-point scale (0 to 3 points), wich based on conventional features [5], where a mark of 1 – high-ornamental healthy trees with a beautiful crown. Obtained results were processed statistically.

To estimate the level of prevalence of species in street plantings was analyzed according to three criteria: occurrence of the tree species in street plantations, which was calculated as a ratio of quantity of streets where this species was found in the total quantity of investigated streets [6]; the part of tree species in street plantings, which was calculated as the ratio of the number of representative species to the total number of investigated tree plants. The structural analysis of tree plantations with classification of species for their occurrence percentage was made [7]. The correlation of native and introduced species was determined. Tree plantations were evaluated by the ornamental longevity scale [8].

Results of the research. Vyshgorod town, which was first mentioned in chronicles in the 946, is one of the historical small towns of Kiev aglomeration. The most ancient planning elements of Vishgorod town are Kalnyshevsky street, partially – Mezhygirsky Spas st. [9]. In the early 1960s the historical network of streets of south part of town was redesigned. In the south-west direction, from the crossing Sholudenka and Naberezhna streets was laid the Dniprovska street, and almost parallel to Naberezhna street - the main transport axis - Ivan Mazepa avenue, visually oriented to the main historical and significance architectural forming dominant of town - the Saint Boris and Gleb church, located on the eastern hill in the center part of the ancient town. At the same time was fulfieled landscaping of this streets.

The significance of landscaping of Vishgorod is identical to its importance in large cities, including Kiev, which it is a suburb. The main sources of air pollution there are energy industries and transport. Today, on the territory of town lies 23 ways [10]. The length of the street and road network of Vishgorod is more than 67 km, including the extent of urban highways and roads of national significance is 7 km, roads of district significance - 5 km, the rest - over 55 km - streets and local roads. About 70 % of urban streets are paved, including more than 64 % - asphalted.

Today the road ancient streets (Kalnyshevsky, Mezhygirsky Spas) are almost without plants, along theire roadways are only single trees. Ivan Mazepa and Kyivky Prospectuses, Sholudenko, Dnieper streets observed relatively better landscaping, designed by linear tree plants.

According to I. Parnikoza and M. Chernyshenko dates [11], in areas of natural vegetation in Vyshgorod (system of gullies between Sholudenko and Hrushevsky streets and northeast from Sholudenko street, areas along the foots of Vyshgorod cliffs) there are tree species, such as *Populus nigra* L., *P . tremula* L., *Armeniaca vulgaris* Lam., *Salix alba* L., *S. cinerea* L., *Betula pendula* Roth., *Pinus sylvestris* L., in the shrub layer - *Rosa canina* L., *Crataegus curvicepala* Lindm. According to our results (Table 1), in the street plantings of Vishgorod presented 33 tree and shrub species. On the investigated area in street plantings have not been recorded such common on areas with natural vegetation native species, as *Populus tremula*, *Salix cinerea*, *Pinus sylvestris*, *Crataegus curvicepala*. The four most common species of street plantings - *Aesculus hyppocastanum* L., *Tilia cordata* Mill., *Acer platanoides* L. and *Populus pyramidalis* Roz. About 54.8 % tree plants accounted for its.

Highest level of occurrence (71.4 and 85.7 %) in the street stands of town have *Aesculus hyppocastanum* and *Tilia cordata,* which also have the highest percentage of presence (respectively 19.0 and 14.0 %). Occurrence index at a level of 50 % (plants meet no less than half of the researched sites) are *Armeniaca vulgaris*, *Betula pendula*, *Populus pyramidalis*, *Juglans regia* L. Low rates of occurrence in

street plantings (at 21.4% and below) specific to such tree species as *Acer campestre* L., *Thuja occidentalis* L., *Cerasus vulgaris* Mill., *Morus alba* L., *Pyrus communis* L., *Carpinus betulus* L., *Ulmus scabra* Mill., *U. foliacea* Gilib., in particular at the level of 21.4 % - for *Ulmus scabra, Pyrus communis* L., *Malus silvestris* Mill., *Thuja occidentalis* L., *Morus alba*, *Acer campestre*; equal to 14.3 % - to *Carpinus betulus* L., *Syringa vulgaris* L.; 7,1 % - for *Quercus robur* L., *Picea excelsa* Link., *Sorbus aucuparia* L., *Alnus glutinosa* Gaertn., *Elaeagnus argentea* Pursch., *Robinia Viscosa* Vent., *Rosa rugosa* Thunb. and *Berberis thunbergii* DC, Table 1, Figure 1).

1. Analysis of tree street plantations of Vishgorod town

Specie name	**Occurrence, %**	**Percentage of presence**		**Longevity class**
		%	**Index**	
Populus nigra	35,7	4,8	3	3
Armeniaca vulgaris	50,0	3,8	3	3
Salix alba	21,4	0,8	2	3
Betula pendula	50,0	8,7	4	2
Populus pyramidalis Roz.	57,1	10,1	5	3
Tilia (cordata Mill. + *platyphyllos* Scop.*)*	85,7	14,4	5	2
Aesculus hyppocastanum L.	71,4	19,0	5	2
Acer (platanoides L. + *pseudoplatanus* L.*)*	42,9	11,4	5	2
Juglans regia L.	64,3	3,8	3	2
Robinia pseudoacacia L.	28,6	3,3	3	3
Acer negundo L.	42,9	3,1	3	3
Other	$\leq$ 21,4	16,8	1-2	1-3

The species with very high percentage of presence (class 5) are *Populus pyramidalis*, *Tilia cordata*, *Aesculus hyppocastanum*; with high percentage of presence (class 4) - *Betula pendula*; with middle (class 3) - five species: *Populus nigra*, *Armeniaca vulgaris* , *Juglans regia*, *Robinia pseudoacacia*, *Acer negundo*; very low and low - *Salix alba* and the rest 22 species.

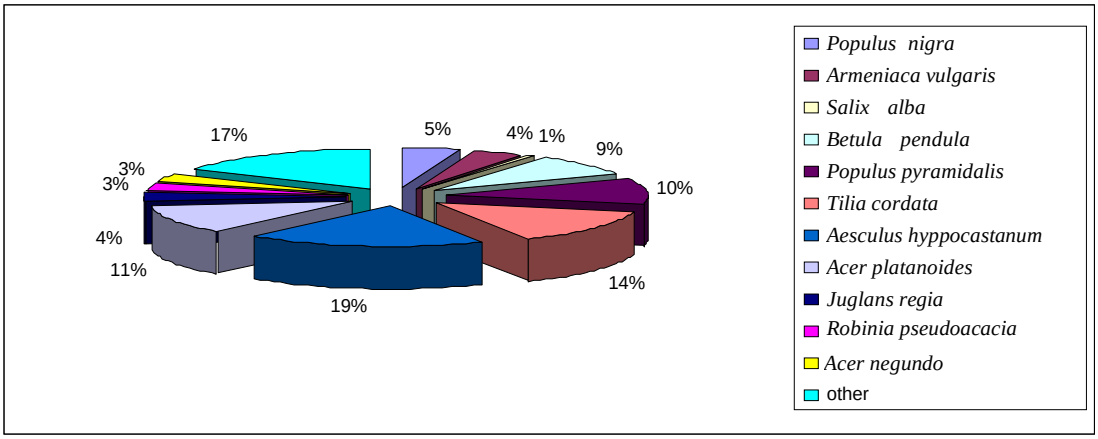

Figure 1 Occurrence of the different tree species in street stands of Vishgorod

Shannon-Wiener index for the studied street plantings are 1.2 - 46.2 % of the trees are alien species, that is, their share is unreasonably high.

The oldest species - *Salix alba*, *Populus nigra* and *P. pyramidalis* (average age correspondingly 63 and 61years, Table 2), the youngest - *Cherry*, *Juglans regia*,

2. Characteristics of the most common tree species in street plantations of Vishgorod town

Specie name	Age, year	Height, m	Diameter, cm	Condition (M±m), points	Ornamental state (M±m), points
Salix alba	63±2,5	9±1,2	69±19,8	2,5±0,29	1,8±0,48
Populus nigra	61±1,0	11±1,1	91±9,1	2,8±0,29	2,6±0,38
Populus pyramidalis	61±1,0	11±0,7	83±4,7	2,8±0,16	2,5±0,14
Robinia pseudoacacia	58±3,2	10±1,6	57±4,6	2,7±0,13	2,6±0,29
Acer platanoides	53±10,5	8±1,6	41±6,8	3,0±0,4	2,7±0,40
Acer negundo	53±3,4	8±1,1	52±7,1	2,9±0,05	2,8±0,07
Acer saccharinum L.	53±3,2	8±0,8	60±2,9	2,8±0,25	2,5±0,16
Aesculus hyppocastanum	44±4,4	8±0,8	39±6,3	3,1±0,10	2,9±0,06
Betula pendula	42±7,4	8±1,1	39±7,1	3±0,27	2,6±0,16
Tilia cordata	39±3,8	8±0,8	37±5,2	2,7±0,12	2,5±0,11
Armeniaca vulgaris	30±2,4	5±0,5	25±5,1	2,9±0,17	2,5±0,19
Juglans regia	26±6,6	5±1,0	32±9,7	2,8±0,15	2,7±0,17
Cerasus vulgaris	23±6,0	5±1,2	11±2,9	2,7±0,33	2,3±0,33

Armeniaca vulgaris (average age correspondingly 23, 26 and 30 years). Average age of trees in the reserched street plantings - 47 years. A similar pattern

to the average diameter at breast height (Fig. 3) ¬ the thickest species are *Populus nigra*, *P. pyramidalis* and *Salix alba* (respectively 91, 83 and 69 cm). Average diameter of the street stands - 47 cm.

The average class of longevity of street tree plantations in Vishgorod - 2.3, which is consistent with our previous reserching []. The majority - 57.3 % of the trees - belonging to the second class of longevity, the tree with the highest level of of longevity (those preserving the ornamental quality to age 50 years or more) are only singly. Given the average age items of tree species in street plantations, the problem of their reaching of retirement age is clearly defined. In connecting with this, there is nessesity in reconstruction (replacement on younger specimens).

The highest tree species are *Populus nigra* and *P. Pyramidalis*, and also old plantations of *Robinia pseudoacacia* (Fig. 4). Average height of street tree plantations - 8.3 m.

Average class of state of tree street plantations - 2.9 - that is close to satisfactory. Something better state have *Salix alba* (2,5), *Cerasus vulgaris*, *Robinia pseudoacacia*, *Tilia cordata* (at the level 2.7). The worst condition of trees *Aesculus hyppocastanum*, that almost all affected by spot and mine moth. The state items highly correlated with ornamental state items of tree species: high value - 1.8 points observed for *Salix alba*, at level 2.3 - for *Cerasus vulgaris*, the lowest - 2.9 - for *Aesculus hyppocastanum*.

CONCLUSION

The investigation showed, that in urban street plantings Vishgorod town occur 33 tree and shrub species, the most common of which are *Aesculus hyppocastanum*, *Tilia cordata*, *Acer platanoides* and *Populus pyramidalis*, which accounting 54.8 % of the plants. Not less than on half of the research objects presents *Armeniaca vulgaris*, *Betula pendula*, *Populus pyramidalis*, *Juglans regia*.

The average age of trees in researched street plantings - 47 years, average diameter - 47 cm, height - 8,3 m. The state of tree street plantations close to satisfactory. The worst condition and lowest ornamental state are characterized for

Aesculus hyppocastanum tree. The most of trees in street plantings of Vishgorod town classify to the second longevity class and reached of limit ornamental age.

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